PERSONAL COMPUTER NEWS

THE COMPLETE COMPUTING WEEKLY

WEEK ENDING APRIL 15th

35p

HARDWARE

PRO-TEST OF THE 700

Full hands on the new micro from Commodore

PERIPHERALS PRO-TEST

TAPING THE BBC

Ikon's Hobbit bridges the disk/cassette price gap

SOFTWARE

TESTING 1-2-3

US star package gets the PCN Pro-Test

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PCN Pro-Test puts the Commodore 700 through its paces

-page 34

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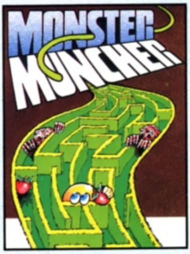
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PC 1

Pull-out Micropaedia: Go Forth Part 2

Find out what Forth can do for some of the most popular micros

MENU

CHARACTER SET

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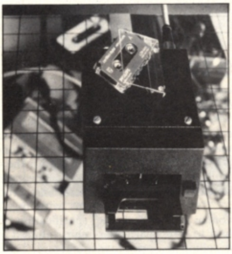
Published by VNU Business Publications, Evelyn House, 62 Oxford Street, London W1A 2HG

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Typeset by Quickset, 184-186 Old Street, London EC1. Printed by Chase Web Offset, St Austell, Cornwall. Distributed by Seymour Press, 334 Brixton Road, London SW9, 01-733 4444.

PCN SPECIALS

PCN PRO-TESTS



REGULARS





Cover photography of Commodore 700 by Chris Stevens.

Laser cuts colour cost

By Ralph Bancroft

The price barrier for colour micros will come tumbling down again next month with the launch of a colour machine that will cost only £70.

The micro is called the Laser 200 and comes with 4K of RAM which can be expanded to 64K.

It is being made in Hong Kong by Video Technology, the same company that makes the Texet TX8000 (*PCN, March 18*). Not surprisingly there are great similarities between the machines.

The key difference is that the Laser will cost £30 less than the Texet and the only apparent hardware difference is that the Laser has 4K memory to Texet's 8K.

The Laser will have nine colour, 128 × 48 graphics and a text screen of 32 × 16 characters. There will be a cassette interface as standard and options will allow you to add disks and serial and parallel interfaces. The keyboard will be Spectrum-like with rubber keys.

Also like the Spectrum, the keyboard gives single key entry for the most used Basic commands. Unlike the Spectrum you will have the option of typing out the commands in full.

The UK distributor of the Laser, Leisure-Zone, is reluctant to reveal more about the machine, claiming that it wants to make sure that when it formally announces the machine plenty of supplies are available together with a good choice of bug-free software.

One of the most interesting pieces of software under development is a super-fast Basic called Laserspeed. It will be a shorthand version of the language that will allow the user to create programs that run four times as fast as standard Basic.

Other software packages that will be available include a selection of games such as chess and look-alikes of Batman, ET and Space Invaders.

Leisure-zone wanted to launch the machine this month but has delayed it because of problems with the manuals which have had to be completely re-written. There have also been bugs in the RAM-packs which expand the memory by 16K up to a total of 64K.

The machine will be sold through High Street shops.

Fair at Fest

A three-day computer fair will be the focal point of the first London Computer Festival, the two-week event which began on April 3.

The Computer Fair will be held at Central Hall, Westminster, between April 14-16 and will culminate in a huge bring-and-buy sale enabling you to trade in your machines.

A small commission will be charged for items sold, and the Computer Junk Shop also promises to provide a large amount of surplus and second-hand equipment at low prices.

More than 70 exhibitors and 20,000 visitors are expected at the fair, which is aimed at hobbyists, education and small businesses.

Profits from the fair go towards promoting hobby computing, setting up new clubs in the London area and purchasing equipment for club use.

Admission is £1.50 for adults, £1 for children and the fair is open from 10am-6pm.



Spectrum interface — Kempston has come up with an interface that will let you use Centronics-type printers with a Sinclair Spectrum. The interface costs £45 including VAT and comes from Kempston (Micro) Electronics on Bedford 852997.

Oric price to rise

The 16K Oric, due for release in June, will be more expensive than advertised.

The original price of £99 will rise slightly for mail order customers — who will receive the machine first — while prices will be higher for those buying from dealers.

An Oric spokeswoman said that prices are bound to rise because mail order selling is being dropped. Oric will be dealing through Smiths, Currys, Micro Peripherals, Dixons, Greens, Laskys, Spectrum Centres and other specialist shops.

The 16K version is late for two reasons, according to managing director Barry Muncaster. First, demand for the 48K exceeded all expectations. Secondly, there were production problems with the 16K when the specification of a particular chip altered just prior to manufacture.

Oric says that the 16K would look exactly the same as the 48K, the only difference being the memory.

Dragon roars

Sound effects for the Dragon 32 are on the way courtesy of JCB Microsystems.

JCB has released a sound synthesiser fluent in all the firm favourites of the video games arcade.

The module allows the Dragon to mimick gunshots, explosions, car horns and other death-dealing sounds. It also provides facilities for musical ditty composition. The Sound Extension Module (SEM) plugs into the expansion port like a games cartridge.

From here it resides in a section of the Dragon's memory and its facilities are available through the Basic language. As many of the sounds are created by the sound chip in the module and are not directly under the control of the processor, the Dragon can get on with its other tasks allowing you to create graphics and give them a musical accompaniment simultaneously, without the action slowing down to a crawl.

Torch menu

If you hunger for Torch business programs, Torch is hoping you'll order them all from the same menu.

Torch last week announced its Torch-Cell cellular software-system, which allows you to run any Torch business program from a master menu. The cellular concept is pushed none too subtly by the name of their first Torch-Cell module — The Amoeba.

The Amoeba is what Torch calls a 'menu-driven front-end' and acts as a directory for all the other software cells you connect to it. Torch says it has plans to launch Torch-Cell business programs for word processing, accounts management, business graphics, electronic mail and customer records and storage.

Because the Torch-Cell system should allow you to reconfigure your existing packages to interact with new programs, Torch claims to have found a way of 'future-proofing' its computer.

The Amoeba employs a series of colour-coded menus which can be modified to provide as much or as little information as you want. You can also use the Amoeba to summon and process files from overseas, using Torch-Mail, Packet Switch Stream, Prestel or Telecom Gold.

The Torch-Cell system can also be used on the BBC Micro, if you already own Torch's Z80 Disk Pack.

An Ajile PC crosses pond

A portable IBM-compatible system is on its way across the Atlantic from Canada.

The Ajile, produced by Bytek, was launched in the UK last week by peripherals specialist Anderson Jacobson. It will be available in quantity soon, Anderson Jacobson says, and it will cost £3,600.

Besides full software compatibility with the IBM PC the Ajile has 256K of memory for you to play with, a small screen, and twin disk drives.

Micro Lisp

By Shirley Fawcett

Lisp, the fifth-generation language that's fast becoming fashionable in the micro community, is now on offer to users of popular 16-bit micros for £100.

Graphical Software of Cambridge says that its Crest Lisp interpreter will run on any MS-DOS or CP/M-86 micro, including the IBM Personal Computer and the Sirius. The interpreter comes complete with Graphical's Crest operating system front-end, which fits on top of MS-DOS or CP/M-86 to make them less cumbersome to use.

Lisp is enjoying something of a boom at the moment because it has been adopted as one of the main tools for artificial intelligence research. It will handle very complex data structures so it is a natural for expert systems. But John Anderson, a director with Graphical Software, said that Lisp is starting to break out of the academic world.

'Education is certainly one of the main areas where Lisp is catching on,' said Mr Anderson. 'But we are also talking to a lot of one-man outfits working from home, wanting to use it to develop their products, and even an insurance company. It seems to be one of those languages that everyone is interested in taking a look at'.

Crest Lisp comes very close to being an exact implementation of Utah University's Standard Lisp, one of the most widely used dialects of the language, Mr Anderson said. But it will not support vectors directly, and there are differences in error handling as well as some extensions to the Eval operator. Some of the standard Lisp library routines are also not supported by Graphical Systems, but the company has thrown in some extra features such as floating point capability and Trace utility.

The Crest interpreter is actually based on Exeter University's interpreter, but Graphical Software will be marketing it themselves, Mr Anderson said.



WINNER IN STORE — Britain may one day be known as a nation of computerised shopkeepers if the winning entry in the junior section of a national computer software competition is anything to go by. The Small Shopkeeper's Promotional Software System developed by three students from Wadebridge School, Cornwall, collected the top prize of £400 for the authors and £1000-worth of computing equipment for their school.

Tandy joins portable competition

Tandy has joined the portable micro fray with a machine that you should be able to get hold of in the next few months.

The Tandy 100 was launched in the US last week. Battery powered, with an 8×40 character screen, and with some applications and utilities held on ROM chips, it will compete with such devices as the Epson HX-20.

The Model 100 sells for $795 in the US — according to Tandy a UK price has not yet been fixed.

The main feature of the Model 100 is Tandy's approach to software. The system is primarily intended to perform a limited number of tasks very simply.

Its ROM chips hold a text editor, automatic telephone dialling, other communications facilities and list handling software.

VIEW FROM JAPAN



Print quality up as price comes down

A bumper crop of printers with steadily improving features has flourished in Japan in the last couple of years. Dot matrix printers control nearly all the domestic market, since generally they are not only cheaper and faster than daisywheel and spindle-type printers, but are also more versatile and able to produce detailed graphics including complex Japanese written characters.

Japan's manufacturers have concentrated on developing quicker, better quality and lower-printed dot matrix printers in a way that could put them well out into the forefront for future sales worldwide. Of course, they are making daisywheel and other types too, but these are almost entirely sold overseas, whereby Japanese manufacturers actually produce the printers but western companies put their names on the products under licence.

Epson's new FX80 and RX80 are obviously representative of the kind of dot matrix printers we can expect from other Japanese makers during the coming year. The FX80 replaces and costs the same as MX80 111. But for that same price of 135,000 yen (£380) you get price plus the printing speed — now about 160 characters per second. This in itself is a first by Japanese producers, since previously dot matrix printers for micros could print up to only 100 CPS.

For that same price, too, the buyer can now use not only fanfold and rolled paper but single cut sheets as well.

The RX80, on the other hand, does nearly as well for the bold new low price of 80,000 yen (£225).

In a country where fewer than 10 per cent of computer users feel comfortable working in English, it is not surprising that manufacturers have concentrated on making their computers more friendly by communicating in the native language, that is, by using a combination of 3,000 Chinese and Japanese characters. These characters are often written with a dozen or more strokes — therefore, a high quality, flexible dot matrix system is necessary to form each character.

In dot matrix, a character's form is stored in memory as software, which can easily be changed by altering the program. Characters on daisywheels, on the hand, are held on hardware.

With the normal character set, the print quality of most Japanese dot matrix machines is similar and very mediocre. But almost all are programmable for multi-path printing, so the same line is printed twice, as the carriage moves forward and back. In this way, the dots overlap, forming full characters that are almost of letter quality.

The day is surely coming when not only your personal work but also your business letters will be acceptably printed in letter-quality dot matrix.

Sharp's colour cost-cutter

For superb pictures and graphics at a low reproduction cost, nothing in Japan prints quite like Sharp's new Colour Image Printer Model 700. Noiseless and fast like other ink-jet printers, the economical 700 prints high clarity images in seven colours and sells for under 200,000 yen (£560).

Besides its four basic inks of blue, yellow, magenta and black, three additional mixed colours — green, orange and purple — can also be produced. Each of the four basic colours has four nozzles, where small droplets of ink form to cover the proper areas of the paper. Whole A4 pages can be printed in about four minutes at a cost per copy of 1/50th of a normal photograph.

Flexible because the form of each character is computer-controlled, Sharp's compact model 700 is especially suited for designers, architects, researchers and office workers needing to reproduce colour pictures and graphics on a tight budget.

For now, this colour printer operates only with a Sharp pc keyboard but any colour monitor can be used.



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Encotel nets micros

The first batch of the new Televideo 16-bit micros have finally hit British shores.

With the ability to create illustrations for business presentations, reports charting and graphing software packages, TeleVideo says its two models TS1602G and TS160GH have a computer and graphics processor which make the machines five times faster than most competitors.

The TS1600 range includes a computer workstation, a stand-alone computer with dual floppy disks holding — 1Mb, and a stand-alone computer with one floppy disk holding half a Megabyte and a 9.6 Mb Winchester hard disk drive.

Both machines run the CP/M operating system and can work with the existing 8-bit TeleVideo range of machines.

Prices start around £1,600 for the TS1600G workstation.

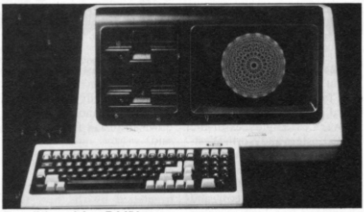
In addition, business users can take their first step into networking with the choice of three Televideo CP/M-based machines.

The range includes an 8-bit TS803 and two 16-bit micros, TS1603 and TS1600.

The Televideo system is designed to incorporate both eight and 16-bit microcomputers into the same network and allow them to exchange information and share databases.

The price is around £2,600 for the TS1603 and £1,250 for the TS1600.

The distributor for the TeleVideo range of products is Encotel Systems, tel: 01-686 9687/8.



First off the rank from TeleVideo

Buy 'n Try weathers storm

The controversial Buy 'n Try software scheme has weathered a legal storm and has emerged in more bouyant shape than ever.

The Software Centre, which launched Buy 'n Try last month, has reached an agreement with software supplier Quicksilva to stave off further legal problems. It now plans to open two new stores in Leicester and Ilford.

Its first store is in London's West End.

A joint statement from The Software Centre and Quicksilva said that Buy 'n Try was back in business with some modifications. If you buy a game from the Software Centre you now have only one month to return it and claim your 80 per cent refund rather than six months. You will also have to sign an undertaking not to copy any of the software.

The statement also holds provisions to protect Quicksilva, but the good news for users is that the scheme and its suppliers seem to have learned to live with each other. A spokesman for Quicksilva said: 'We believe we've achieved our objective.'

The Software Centre will try to reassure other suppliers by offering them the same terms it has agreed with Quicksilva.



Software Centre still on course

Titanic IBM

Go-faster stripes in the grand manner are now available for your IBM PC.

The Titan is a new multifunction board to soup up your IBM PC without clogging up its slots.

It combines two serial ports, a parallel port, a hard disk interface, a real time clock with battery back up and 64-576K of RAM. And it has software to support the clock, a hard disk and a RAM disk and print spooler. All this for only £449.

Titan is brought to you by Pete and Pam Computers on 0706 227011.

PCN Charts

PCN Charts follows the rise and fall of the UK's best-selling micros. This fortnightly top-of-the-shops list tells you what's selling best over the counter; it does not take account of mail order and does not count deposit-only orders. This week's figures show the number of machines sold in the two-week period ending a week before publication date (in this case April 8), so these charts tell the story in high streets between March 18 and April 1.

Machine prices quoted are for the no-frills models and include VAT. Information for the PCN Charts is culled from retailers and dealers throughout the country and compiled by MRIB, London. They will be updated every alternate week . . . so watch for the arrows to follow the ups and downs of the best-sellers.

Top Twenty up to £1,000

			MODEL	PRICE	DISTRIBUTOR
▲	**1**	(3)	Sinclair Spectrum	£125	(SI)
►	**2**	(2)	Sinclair ZX81	£50	(SI)
▼	**3**	(1)	BBC Model B	£399	(AC)
▲	**4**	(7)	Dragon 32	£200	(DR)
▲	**5**	(6)	Commodore Vic-20	£170	(CO)
▲	**6**	(9)	Oric 1	£100	(OR)
▲	**7**	(17)	Lynx 48	£225	(CA)
▼	**8**	(4)	Atari 400	£160	(AT)
▲	**9**	(14)	Sharp PC 1500	£170	(SH)
▲	**10**	(11)	Commodore 64	£345	(CO)
▼	**11**	(10)	Atari 800	£400	(AT)
▲	**12**	(15)	Texas TI99	£150	(TE)
▼	**13**	(5)	Newbrain A	£228	(GR)
▼	**14**	(12)	Acorn Atom	£174	(AC)
	15	(—)	Sharp PC 1251	£80	(SH)
▼	**16**	(8)	Jupiter Ace	£90	(JU)
▼	**17**	(13)	Apple II	£776	(AP)
►	**18**	(18)	Colour Genie	£224	(LO)
▼	**19**	(16)	Epson HX20	£472	(EP)
▼	**20**	(19)	Tandy TRS (C/C)	£240	(TA)

Top Ten over £1,000

►	**1**	(1)	Sirius 1	£2,754	(SI)
►	**2**	(2)	Osborne 1	£1,581	(OS)
►	**3**	(3)	Olivetti M20	£2,754	(OL)
▲	**4**	(6)	Commodore 8032	£1,029	(CO)
▼	**5**	(4)	HP 86A	£1,541	(HP)
	6	(—)	IBM PC	£2,392	(KG)
►	**7**	(7)	Sanyo MBC 1000	£1,195	(SA)
►	**8**	(8)	Micro-Mimi 803	£1,720	(BM)
▼	**9**	(5)	Apple III	£2,780	(AP)
►	**10**	(10)	Xerox 820	£2,415	(RX)

AC Acorn Computers. **ACT** — ACT Sirius. **AP** — Apple Computers. **AT** — Atari International. **BM** — British Micro. **CA** — Camputers. **CO** — Commodore. **DR** — Dragon Data. **EP** — Epson. **GR** — Grundy Business. **HP** — Hewlett-Packard. **IC** — Icarus Computers. **KG** — KGB Micros. **LO** — Lowe Electronics. **MM** — Micro Marketing. **OL** — Olivetti. **OR** — Oric. **OS** — Osborne Computers Corporation. **RX** — Rank Xerox. **SA** — Sanyo Marubeni. **SH** — Sharp. **SI** — Sinclair. **TA** — Tandy. **TE** — Texas Instruments.

Electrifying offer is oversubscribed

By Ralph Bancroft

If you want a cheap micro it pays to work for an electricity board.

Over 500 employees of the South Eastern and North Western Electricity Boards have bought BBC micros as a result of a special scheme. This gave them £50 towards the cost, and an interest-free loan to cover the remainder.

The scheme also includes free training in how to write programs, and cash prizes for software written for use by the Board.

The scheme was pioneered by the South Eastern Electricity Board (SEEBOARD) and its enthusiastic chairman Robert Peddie.

'We were fully conscious that computer technology is coming down the road fairly fast,' he said.

'The problem is one of education and training to make sure that employees are not frightened by the new technology.'

His solution was to put out a poster offering £50 to every member of staff who bought a BBC micro and a free one week programming course.

The response was dramatic. Over 250 people applied and the list had to be closed after only a few days. There are now computer clubs in every management section and Mr Peddie has used Board funds to buy each section a disk drive and printer that can be borrowed by the clubs for use during their club nights.

The North Western Electricity Board (NORWEB) has now copied the idea and over 200 employees have taken advantage of the cheap micro offer. It is also paying the course fees for any member of staff who completes the National Extension College course in Basic.

The scheme is so successful that Mr Peddie is now under pressure from the trade unions to reopen the offer.

More micro training for schoolkids

Schoolkids may be in for a welcome change in their computer studies courses.

The Government-funded Microelectronics in Education Programme aims to introduce much more systems analysis into the curriculum, making computer 'O' and 'A' levels more practical in content for those wanting a computing career.

John Anderson, deputy director of the MEP said: 'Attitudes about what needs to be taught have changed. We expect to be successful — after all, two years ago, most education authorities did not have a computer advisor to help with the computer studies curriculum, and they do now.'

MEP is aiming to win teachers over to its syllabus through its own teacher training courses, which take place at 14 nationwide MEP centres.

Training has been going on since December 1981 and by the end of the programme in 1986, £20 million will have been given by the Government.

Multitech Micro Prof launched



Taiwanese micro to make official debut.

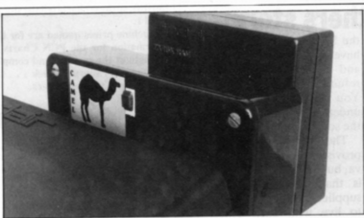
A Taiwanese micro that you could previously only get from Flight Electronics of Southampton is about to be officially launched in the UK.

Multitech's Micro Professor MPF II is now to be sold by Sirtel UK and its authorised distributors — Flight Electronics is one.

The MPF II is a 64K machine with a Qwerty keyboard, six-colour graphics and an Applesoft compatible Basic. Its base price is £269.

Multitech offers more than 100 games and business software packages, and you can add to them from Applesoft.

Sirtel UK is on Peterborough (0733) 236010.



MEMORY MODULE — Sinclair users can now plug even more memory into their ZX81s. The Memic-81 adds 2K of RAM while the 81.2 adds 4K. Because both are based on CMOS semiconductor technology they can retain data for up to ten years on a long life Lithium battery. Memic units can be plugged anywhere in the 8-16K area of the ZX81's memory map. The Memic 81 costs £24.95, the 81.2 £29.95 from Cambridge Microelectronics (Camel) on 0223-314814.

Prices cut

Rabbit Software has slashed prices on ten new packages for Commodore 64 and Vic-20 users.

The cut-price packages include nine adventure games, down from £9.99 to £5.99. The titles for the Vic-20 are Super Powertrooper, Antimatter Splatter, The Catch, Critters and Race Fun. Pakacuda, Escape MCP, Cyclons and Centropods will run on both Commodore machines.

And English Invaders, an educational package, is aimed at children wanting to learn their verbs, adjectives and nouns in a fun way.

Floyd Thomas of Rabbit said: 'We are knocking down the prices of these new packages because we have invested in our own tape duplicating machine.

'Production, quantity and quality will be in our control and it will allow us to cut the end user price.'

The packages will be available from Laskeys, Currys, Micro C, Vulcan Electronics and Spectrum UK from May 1.

Some of these packages are based on popular games. For instance, Pakacuda is a PacMan type game and Centropods comes from the centipede kind of game. Escape MCP is a game adapted from the film 'Tron'.

The bulls, bears and millionaires

Don't jump out of a high window if you lose at a new game from Pete & Pam.

Written by Blue Chip Software, California, Millionaire simulates the stock market and is offered for educational purposes, particularly in maths or economics classes.

Pete & Pam has versions in stock for the IBM PC and Apple II at present — prices are £69.95 and £59.95 respectively, plus VAT.

The game is based on the US stock market but uses the same principles as the UK market. Each week you have the opportunity to buy or sell stocks or options. You have to pay brokers' commission and you don't escape the tax man either, but your ultimate aim is to make a vast profit.

Millionaire is available direct from Pete & Pam Computers, New Hall Hey Road, Rossendale, Lancs, telephone 0706-227011.

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Seiko in business

You will soon be able to sport a Seiko on your desk as well as on your wrist.

Two new microcomputers developed by Seikosha, the company responsible for the watches, will be on sale in the UK early next month.

The 8600 is a 16-bit general purpose business machine. Based on the Intel 8086, with 128K of RAM as standard, it will set you back about £3,300. The price includes five input/output ports and 640K floppy disk drives as well as a choice of operating system — any one from CP/M-86, MS/DOS, MP/M-86 and Unidol (a version of the Unix II operating system).



Another for the desktop: Seiko's 8600

You can up the memory to 512K and add 10Mb to the on-line storage with hard disks and expansion boards.

Marubeni, the company distributing the machine in Europe, believes you will be particularly interested in the 8600 if you have any future plans to upgrade to a multi-user system.

'You can easily enhance the 8600 to support four simultaneous users,' explained Colin Turney, a consultant for Marubeni.

For engineering and scientific users, Marubeni is offering the 9500, a Seiko machine that uses Intel's iRMX86 operating system and starts at a price of £8,200.

The UK distributor for the machines has not been appointed.

For more information on the Seiko line call Marubeni on 01-407 8300.

Apple database directly

You can now buy the Superfile Apple database direct from Ranmor Computing of Southend or from Apple dealers. Support is generally available from either.

Richard Morley, technical director of Ranmor, says of the UK-designed database: 'It has no limit on the number of files per record. It optimises the use of disk space and provides rapid retrieval.'

The system, he says, uses about half the storage space that conventional database managers use and makes it simple to store, look at and alter information like stock lists and addresses. It costs £375.

Ranmor is on, Southend (0702) 339262.

The terminal excuse for a desktop perk

You will soon have a new excuse for getting your company to buy a personal computer. It can be a terminal for the company's IBM mainframe.

Encotel Systems will be launching a software package for micros running CP/M or CP/M-86 in June. It will emulate a remote 3270 SNA (Systems Network Architecture) terminal.

MicroSNA, which will cost about £600, offers compatibility with standard IBM systems software and allows data transfer between the micro's floppy disks and the mainframe.

Encotel is on 01-680 6040.

New toy for the playful executive

If you're afraid that playing games is playing havoc with the keyboard of your IBM or Apple, you might be interested in a new joystick from Pete & Pam.

The UK software distributors have just begun selling the TG Joystick for Apple II, Apple III and the IBM PC. At £39.95 it's certainly an upmarket toy — Pete & Pam describe it as 'the ultimate man-machine interface'.

The device offers completely



Top toy: TG joystick

linear operation, as well as a trim adjustment that allows you to calibrate it for specific applications, according to Pete & Pam. Its large firing buttons are designed to be easy to use.

For more information on this Texas-made product contact Pete & Pam on 01-769 1022 or 0706-227011.

Kuma's soft communications

A new piece of software is available to broaden the scope of your Epson HX-20.

Kuma has written Desk Master 4, a program which transforms the Epson into a telex terminal using the Sendata acoustic coupler (*PCN, April 1*). You can also use the system to link the Epson with other computers.

Kuma says Desk Master 4 offers full or half duplex operation with a choice of 110,150 or 300 bits per second transmission rates. A similar system is available for the Osborne.

The program is written in machine code and provides a buffer of 8K characters.

The program costs £29.50 plus VAT while the Sendata acoustic coupler is £220 plus VAT.

Males lead way in micro boom

The micro boom is mainly for the male, a survey has discovered.

At risk of appearing sexist, a survey of home computer users in the UK comments: 'Females appear to have little interest in computers.'

After surveying 2,000 households in January and February it reckons that about one home in 20 has a computer. And the main users are sons — 45 per cent of home users are aged 18 or under.

The chances are that if you come into this category you got your micro for Christmas, as 40 per cent of last year's sales were made in December. The ZX81, Spectrum and Vic-20 were the best sellers.

Gowling Marketing Services, which publishes the report, confirms the findings of other surveys by placing Sinclair well in the lead in the UK. The ZX81, it says, has 43 per cent of the market, and the Spectrum 14 per cent. Commodore's Vic-20 is in third place with 12 per cent.

Other micro makers can take comfort from the report's discovery of a replacement market — about one in every seven micro-owning households has already bought two or more systems.

Copies of the report are available from Gowling Marketing Services, Britannia Buildings, Fenwick St, Liverpool L2 7NA, telephone Liverpool (051) 236 6036.

Gowling's report looks like a substantial underestimate by comparison with a survey published in the *Observer* on March 27.

But they agree on at least one point — that since December last year sales have really taken off.



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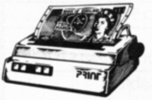
Spectrum scores in selection system

Keith Bowden's letter (*PCN April 1*) gives an excellent review of the Commodore 64, especially where he compares it with the BBC machine.

However, I disagree with his recommended options to potential computer buyers. It took me about six months' reading and thinking before deciding which computer I should buy. In the process, I used techniques and methods which I employ in my job (systems engineering).

First, I clarified to myself the use of the computer. User number one was my ten-year-old son, and a computer would allow him to play games, and without pressure, to become familiar with computer use, program writing and the use of peripherals.

User number two was myself, and the computer would help experiment with various computer languages, especially those relating to artificial intelligence (*eg*, Lisp).



From the requirements above, I concluded that the chosen system should have the following characteristics:—

- A sizeable memory
- Colour
- Availability of a large quantity of ready-made software
- Availability of low-cost peripherals
- Small size, including peripherals, so that the system could be located on a small desk
- It should be available from a local, friendly, reliable vendor

What I did not need was:—

- Full-size keyboard, as neither of us is likely to do lots of typing
- Professional (*ie*, business) system performance once expanded; a small scale model of a computer would satisfy our needs

As a consequence of the above, I bought a Sinclair 48K Spectrum from W H Smith. It not only satisfies my requirements, but I also consider it:—

- Affordable
- Offering a uniquely cost-effective expansion potential
- Offering the most balanced performance in all areas (resolution, available memory, sound, programmability)

Affordability in my case means to spend an amount of money which would not cause a long-term upset to the family finances.

In addition, the relatively small outlay will not preclude a future purchase of a better computer (portable, with disk drives and possibly capable of executing concurrent tasks).

The low-cost expansion potential means the possibility of buying disk drives for £40 and not £200, a printer for £60 and not £300, a Lisp cassette for £15 and not £150 and so on.

In particular, using disk drives entails an extra cost of £30 and not £90 as on the BBC computer. I need a Mini Metro, and if I need an upper class device I buy an IBM PC or a Sirius.

Last, the balanced performance of the Spectrum is admirable — as Adam Osborne once said, the key adjective is 'adequate'.

Dr Robert Tizioni
Camberley, Surrey

When editing, Wordwise works

I was interested to read the comments about Computer Concepts' Wordwise chip in your pull-out BBC section. I use Wordwise, and must point out a major error in your contributor's review.

He states that it cannot be used to edit Basic programs, which is wrong. I use it all the time for this, and it is to me the greatest of all the chip's benefits.

However, you have to spool the listing on to tape or disk, and then back again into the memory using *EXEC. This is a minor drawback, but it is possible, and thus your reviewer is unfair to the product.

In addition, Wordwise does everything the average writer is likely to need. The only drawbacks I would list are the difficulties in arranging the function keys to do complex things which ought to be easier, like superscripts and underlining, and the necessity of *SPOOLing to edit programs. But at least you can print out without SAVEing first!

Finally, Wordwise has one enormous advantage over View: it is easily available.

Andrew Denny,
London SW6

Our reviewer obviously had individual problems! He says he couldn't edit Basic programs in Wordwise, which you and others tell us is possible. So, we need to look again and to be fair to all we are planning a detailed assessment of Wordwise — Ed.

BBC micro's files are faster

Your Micropaedia article on the Econet in you issue dated April 1 was over-pessimistic, and although Acorn's behaviour deserves much worse reviews, their equipment deserves better. There are, anyway, two errors I must correct.

You base your prices on the large fileserver but the performance on the small. The large one, which we have been using with BBC machines since last May, allows any number of files on a disk and you will see by the brief statistics I enclose that we have 300 on one disk and 201 on the other — that is 501 files on the system where your article claimed only 124 was possible.

The small fileserver allows only 124, but that will cost you £150 less in software and £200 less in hardware. The comparison with the number of files available with separate disk units also fails to take into account that *all* users have access to *all* 500-odd files when they are networked.

You also claim that it would take 20 seconds for 20 pupils to load 1K files. Unfortunately I cannot check this at the moment as it is the holidays and most of my machines are away, but when multiple LOADing we normally get a transfer rate around 8K per second, so I think 20 1K files should load under four seconds.

The Econet is slow only when doing single-byte transfers.

C C H Dawkins,
Head of Computing,
Felsted School

There are two types of 'large' fileservers — one uses the £2,000 System Five file server, which clearly is the one you use at Felsted; the other is the 6502 second processor and dual disk drives, which is the one referred to in Micropaedia. The confusion arises in nomenclature, not figures — but we're sorry for the confusion. — Ed.

Keyboard critics are out of touch

Can you tell me why all the reviewers criticise the Spectrum's keyboard? I agree it is not ideal for a touch typist, but how many home computer owners are touch typists? A minority, surely.

I find it ideal for my two-finger typing and find no need for an additional keyboard.

Will the reviewers please note, and remember for whom they are writing the reviews.

W Brown,
Hull, N Humberside

Keep blood out of the classroom

I have been pleased with all aspects of your new magazine, but feel I must take issue with one of your authors. My friend Bob Maunder, in his valuable piece on Oric programming (*March 18*), says 'remember, children seem to prefer the more bloodthirsty effects'.

My disagreement is on two levels. Firstly, I do not believe that all children automatically prefer learning games in which destruction rather than construction is the aim. But secondly, even if they do, surely we should not pander to it!

Folk talk a lot nowadays about the 'hidden curriculum' — what teachers put across sub-consciously by their language and examples. Children learn attitudes this way, and attitudes are just as important as the facts and ideas teachers and parents communicate.

Please Bob — and others developing learning software — supply us with games with a *nice* hidden curriculum!

Eric Deeson,
Organiser, Educational ZX User Group, MUSE

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◄ 13

Teletext took too great a bow

I want to complain about a statement made in part 3 of *PCN* Micropaedia 'Anatomy of the BBC Micro' (*PCN, April 1*).

It states than 'Micronet is certainly no replacement for Acorn's teletext adaptor, but it offers a reasonable alternative — and the adaptor is priced artificially low just to get people using the network.'

Surely it must be obvious that Teletext is the less appetising choice of the two. For your £225 all you get is the normal Teletext service, which costs very little more to obtain when renting a set, and the ability to download a few programs that the BBC deigns to offer.

Compare that to the promised 100 free programs on Micronet 800 and access to Prestel with its thousands of pages, albeit costing you £57 for the adaptor and £52 a year subscription.

As for lowering the price of the adaptor, what is wrong with that? One of the reasons Prestel has been called a 'failure' by some commentators is because of the non-availability of cheap terminals. And hopefully the expected large increase in Prestel users caused by all this will spur manufacturers to develop even cheaper adaptors!

But surely you must be thinking, I'm working for British Telecom or Micronet. I am not, but it seems quite likely that your reviewer is working for the BBC or perhaps Acorn.

Though I expect many people, ranging from teachers to businessmen to home-users, to join Micronet, I doubt that many people other than schools will go very much further with the Telextex adaptor after seeing the price tag.

M Wheatcroft,
London W8.

I can assure you — we have no reviewers working for either British Telecom or Micronet, or any other possible area of conflict — Ed.

Don't waste your chip power

I wasn't surprised, after reading the second issue of *PCN*, that R J Parsons got a bit of stick from readers. But I think they failed to understand the main point of his letter (*ie* these new computer users were wasting their computers by using them solely to play games).

In many respects I feel the same way as does Mr Parsons. Every time I go into the newsagents I am confronted by a host of magazines supposedly dedicated to computer users but in the vast majority of cases they are full of ways of playing games even better rather than introducing ways to expand programming technique to the full.

In other words, the magazines are dedicated to playing games not to computing. The fact that games are played on the computers seems incidental in many ways.

This is really a gross waste of computers, which operate so fast and calculate to such a high precision that playing games on them seems such a waste.

I admit I play the occasional game on a micro but to use a computer for this purpose solely is a waste of the price of a computer. If people really want to play games they should buy themselves a machine dedicated to playing games.

I am a science student at university and I find my Newbrain a godsend when I have to work out many simultaneous equations and other problems. Surely it is far better to use computers for what they were designed for and let people who want to play games stick to a video games machine and not waste their money on a device they will never use to the full.

Roy Church's letter wasn't well received in the second issue either (*PCN, March 25*). However, he does have a point.

Most people will not be affected in the way he suggests but there is a small group of computer users that will.

This group consists of people who are initially very introverted. They find the computer a great friend as it is undemanding and highly attentive and this results in them virtually cutting themselves off from reality.

It should be remembered that this group of people form a small percentage of users and so Roy Church's suggestion that the entire population would become like this is wide of the mark.

Gordon J Milne,
Kincorth, Aberdeen.



ROUTINE INQUIRIES

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BBC's speed leaves Newbrain lagging

According to PCW, Grundy's Newbrain semi 'compiles' its Basic source code into pseudo code to aid execution speed. Why then is the BBC micro with a 2MHz CPU (6502) twice as fast as the Newbrain which runs its CPU at 4 MHz (Z80A)?

I D Walters,
Abertillery, Gwent.

The obvious answer to this is that I don't know either. Usually such differences in execution speed tend to be manifested by the quality of the coding of the appropriate interpreter. The better the code and use of the facilities offered by the CPU then the faster will be the execution.

The fact that the 6502 requires register adjustments to do the same could be a factor to be considered. A definitive answer to this question can be given only after long study of both interpreters.



'I should point out its graphics capability is very limited . . .'

The truth behind Grundigs and RGB

In Anatomy of the BBC Micro, part 2 (*PCN*, March 25) you mention the Grundig 14½in TV/monitors. Are these specially adapted monitors by Newark Video Centre, or are Grundigs already fitted with RGB plugs? If not, have you the address of Newark Video?

Howard Angel,
Harrogate.

The Grundig sets are modified by Newark Video Centre to include an extra board supporting RGB input. These units have so far only been tested and used for BBC Model B machines. However, the company intends to check this modification for other popular machines. The company's address is 108 London Road, Balderton, Newark, Nottinghamshire, tel 0636 71475.

Confusion over cost of the Lynx

Will the 96K CP/M Lynx cost £300 or will it cost £300 for the upgrade plus the £225 for the initial machine. I ask because an article about the Lynx (*PCN*, April 1) confused me about the pricing and I am thinking of buying one.

I A Kirton
West Jesmond,
Newcastle Upon Tyne

On re-reading the article I can see where the confusion arose — sorry. But to cheer you up, £300 includes the machine and the upgrade, ie 48K for £75, which is about par for the course.

PCN DATELINES

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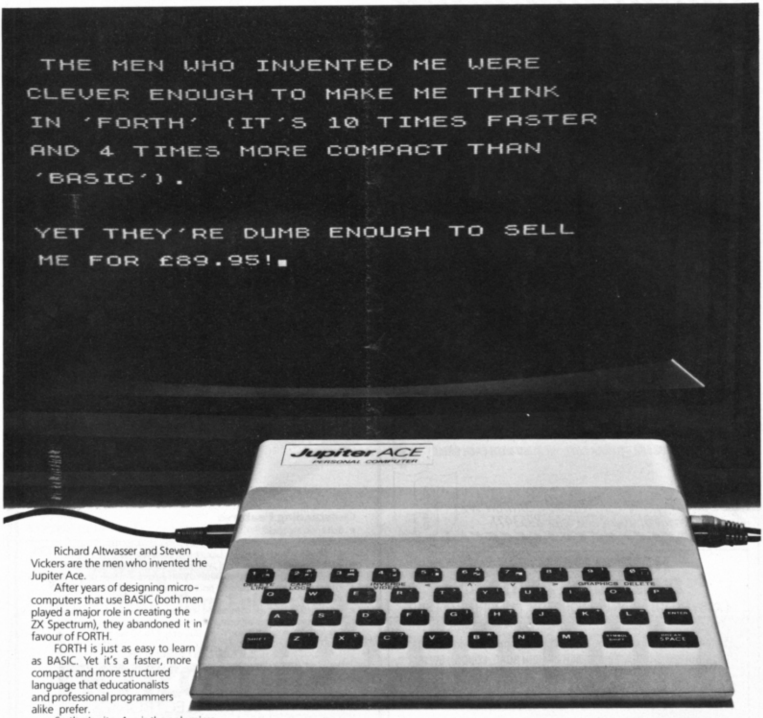
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Event	Dates	Venue	Organisers
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Computer Open Day Exhibition	April 14	Midland Hotel, Manchester	Tony Kaminiski, Couchmead Communications, 01-778 1102
4th London Computer Fair	April 14-16	Central Hall, Westminster, London	Sue Manning, ALCC, 01-226 9874
Manchester Home Computer Show	April 21-23	Midland Hotel, Manchester	Peter Freebrey, ASP Exhibitions, 01-437 1002
HP 1000 Users Exhibition & Conference	April 26-28	Heathrow Penta Hotel, London	Conference Services, 01-584 4226
Computer Trade Show	April 26-28	Wembley Conference Centre, Wembley	John Cole, IPC Exhibitions, 01-643 8040
Midland Computer Show	April 28-30	Bingley Hall, Birmingham	Roy Bratt, IPC Exhibitions, 01-643 8040
RIBA Computer Conference &	May 10-12	Bloomsbury Crest Hotel, London	Joe Hunting, RIBA Services Ltd, 01-637 8991
Micro City '83	May 10-12	Bristol Exhibition Complex	Stephen Hybs, Tomorrow's World Exhibition, 0272 292156
Computer Open Day Exhibition	May 12	The Post House, Southampton	Tony Kaminiski, Couchmead Communications, 01-778 1101

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Event	Dates	Venue	Organisers
Computerised Office Equipment Exhibition	April 5-7	O'Hare Exposition Centre, Rosemont, Illinois, USA	Cahners Exposition Group, 0483 38085
International Computer, Computer & Robot Exhibition	April 14-20	Seoul, Korea	Korea Economic Daily, 441 Chungrimdong, Chung-ku, Seoul 100
Information Management Exhibition & Conference	April 26-28	McCormick Place, Chicago, USA	Tony May, Clapp & Poliak, 021-384 3384
Compec Europe Exhibition	May 3-5	Centre Rogier, Brussels	Tracey Cannon, IPC Exhibitions, 01-643 8040
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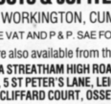
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◀16

See spreadsheets though buff's bluff

I have never yet found a clear explanation of what a spreadsheet is. I have asked other people with micros but all I get is that they are financial. I think I may be able to use one but could you explain exactly what those programs are and what they do?
Sarah James
Glossop,
Manchester

The meaning of spreadsheet programs isn't immediately obvious, because they are the sort of idea that doesn't occur to you unless you are involved with microcomputers. They work just like the paper spreadsheets that accountants doodle on during their work.

The computer screen acts as a window on a large imaginary piece of paper, divided into rows and columns. In each box on the paper you can place a number or a formula, or perhaps a piece of text such as a column heading or title.

The formula relates to the values in other boxes, so one box might be the total of all the figures in the column above it or the sum of all the profits for the 12 columns of monthly figures, and so on.

By building all the necessary formulae, data and headings into a sheet for a particular job you create a model. Change the data, and the model instantly recalculates all the formulae in the sheet.

So changing one number changes all those that relate to it.

You could do a model of your household budget, and then see what happened if the price of milk went up 2p.

Even the first spreadsheet program, VisiCalc, could do more than this, and newer ones can allow graphs to be drawn based on the data in the boxes. You can, therefore, display a pie chart based on figures it would take you all day to calculate.

Then just change one small piece of data, and you'll see the whole thing redrawn.

Spreadsheets are just tools that let a non-computer person persuade a computer to do some useful work.

You need to learn to use a particular program, but that's a great deal easier than learning to program.

If you're serious about using computers it's probably far more important that you learn a spreadsheet than a programming language.

They're also flexible. You can do a lot with spreadsheets besides accounting, particularly with the newer programs, and the best way to understand how they work and how they are useful is to see and use one.

Print-out via your typewriter

I've been told that an ordinary electric typewriter can be used as a printer for a micro. Is this possible, and how do I do it?
Jeremy Morley,
Aldershot, Hants.

It is possible you will be able to use your typewriter as a printer, but it will need a considerable amount of internal modification first.

Your typewriter will need an interface to convert the electrical signals from the micro into a form that selects characters on the typewriter.

There are companies which sell the typewriter-printers which will sell the interface separately so it can be fitted to existing conventional typewriters.

Be warned, though, this is really a job for a service engineer because it normally involves taking the typewriter apart.

There can also be problems when you try to connect the typewriter to the micro as the wiring has to be configured to each type of computer.

The best way to go about this is to talk to your micro dealer about the idea. The dealer can receive a discount from the company that supplies the interface and may, therefore, be prepared to fit it for you.

You won't pay extra for the equipment this way and you will have the added advantage of local support if the system goes faulty.

Jitter bugs the TV picture

I recently bought a BBC Model B and suffered screen flutter I couldn't cure. I was delighted to read in 'Anatomy of the BBC' Micropaedia that 'to fix this jitter use operating system command TV0, 1 and hit return'. I tried this but the command was rejected as 'mistake'. I tried all the variations on TV0, 1 I could think of to no effect. Can you tell me how to get rid of this jitter?
R L Mares
Dunstable, Beds.

TV0, 1 is a command for the BBC's operating system MOS. So to use it from Basic, you need to type a * before it. Try *TV0, 1 and press return. It doesn't take effect until you enter a MODE statement. Page 417 in the manual is a good place to start.

If you still can't get a good picture, try retuning the TV. Sometimes, switching any AFT or AFC control off actually helps.

If you can't get this to work, try a friend's TV. Any further problems and it might be worth a visit to your local Acorn dealer.

Break-out blues mars Spectrum fun

My brother and I have a problem with the ZX Spectrum. We put in a listing of a Spectrum maze and it did not work. We put in RUN and the screen went blank. We decided to break it, but it would not break after repeated attempts. We tried stop . . . it didn't work. We tried everything, but nothing worked so we had to pull the plug on a program that took two hours to put in. Do you know anything else we could have done to break the program?
Dale Phillips
Walsall, West Midlands.

It sound like the Spectrum crashed. A maze program could easily take over a minute to generate a maze but you should be able to break it while it is doing it. There isn't anything else you can do if break doesn't work . . . except pulling the plug.

Moral: always save new programs to tape before running them. If you are keying in anything at all long, for example two hours' key squashing time, save it to tape every ten minutes or so.

Losing two hours work is probably the best way to learn this rule.

Memory upgrade sets 1 and 2 apart

I have recently bought a 16K ZX Spectrum and have lately been searching for a 32K upgrade. However, it seems there are two versions: one for issue 1 Spectrums and another for issue 2 Spectrums. Which type do I buy? I bought my computer after January 1 and it has blue keys.
David Lam
Bermondsey, London.

Issue 1 Spectrums were shipped for the first two or three months only so if you bought your Spectrum after August 1982, chances are it's an issue 2 version.

The later version has room on its circuit board for the 32K upgrade while issue 1 Spectrums use a second piggy-back board for the extra memory.

Sinclair is now offering its own 32K upgrade, in strict rotation, to those who first bought Spectrums.

The company will sort out any problems with the different issues when it makes the upgrade.

If you do have an issue 1 Spectrum and it bothers you, Sinclair will swap it for an issue 2 machine.

Give Atari the TV screen test

In the BBC supplement, there was an article on monitors. I own an Atari 400. Would any of the monitors be suitable for it and would they improve on a standard TV picture?
K Brookes,
Blackhall, Cleveland.

Monitors do give a better picture than TVs but the Atari 400 isn't designed to use one. It has no video or RGB sockets to connect them. Do try your 400 on several different TVs as some give better pictures than others. If you want to use a monitor, you really need an Atari 800.

Dump 'em on Max

Whatever the problem, offload it on Max. He won't always reply with individual letters but he'll find the answer and put it on the weekly Routine Inquiries page. Chances are you're not the only one to hit the same snag.

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Looping the loop with the ZX81

Although ZX81 Basic is a good implementation of the language, there is no REPEAT–UNTIL loop as on the BBC micro or Oric.

I have seen various suggestions for emulating such a loop in the ZX81 using computed GOTO, but this is clumsy and makes renumbering difficult. It is much more elegant to use a FOR–NEXT loop to fulfil this function. The following example shows this:–

```
100 FOR I = 0 TO 0 STEP 0
100...  }
.       } body of loop
.       }
240...  }
250 IF NOT (conditions to be met to suit loop) THEN NEXT I 260...
```

Line 100 is the REPEAT function and line 250 gives the UNTIL. It works because the FOR — NEXT loop is never terminated normally and the NEXT I is executed only if the UNTIL condition is not satisfied, thus repeating the loop.

It is also possible to implement a WHILE–END loop using similar trickery, but in this case you must be a bit naughty and fiddle with the loop counter in the body of the loop. This code will produce the desired effect:

```
100 FOR I = 1 TO (condition to be met while looping)
105...  }
.       } body of loop
.       }
150...  }
155 LET I = NOT (condition to be met while looping)
160 NEXT I
165...
```

Line 100 is the WHILE statement equivalent and lines 155 and 160 together mark the end of the block. In this case if the WHILE condition is true then the upper limit of the FOR loop is set to 1 and the loop is entered. Note that if the lower and upper limits of a FOR–NEXT loop are equal then the loop is executed once. If the condition is false then the upper limit is set to 0 and the loop is never entered. The upper and lower limit of a FOR–NEXT loop are set only once, when the FOR statement is first met in the program stream.

Although one should not do it, it is possible to change the loop counter in the body of the loop. This is done in line 155. If the WHILE condition is still true then I is set to 0 and the loop is re-entered after the NEXT I, since I will be incremented to 1. If the condition is no longer true then I is set to 1 and when NEXT I is executed becomes incremented to 2 and thus the loop is not re-entered.

Both of these constructs allow for more structured programming as there is only one entry and exit point for each loop. Furthermore, there is no sign of one of those dreaded GOTOs.

For those who do not realise the difference between a REPEAT–UNTIL and a WHILE–END loop, you can see from the above that a REPEAT loop must be executed at least once and a WHILE loop might not be executed at all.

M J Plummer,
Redhill, Surrey

Cursory correction for BBC micro

J Plews' suggestion (*PCN*, April 1) for turning off the BBC micro's text cursor is both round-about and incompatible with the Tube. The VDU 23 command can be used to access the registers of the CRTC to turn off the cursor, using:–

```
VDU23; 8202; 0; 0; 0;
```

The cursor is restored at any MODE change. For users of OS 1.0 etc the user guide gives the alternative:–

```
VDU23, 1, 0; 0; 0; 0; to turn off the cursor,
VDU23, 1; 1; 0; 0; 0; to restore the cursor.
```

The only way a function of the type given by U Nalla could obtain the ASCII code of a character at a given position would be in MODE 7, when it would be of the form:–

```
10 DEF FN screen (x, y)
20 = ? (HIMEM + y + 40 + x)
```

In the other MODEs on the BBC, characters exist on the screen only as bit-patterns so a function of the type given above would return one of 8 bytes making up a character. If you have OS 0.1 there is no way out of this dilemma, but for OS 1.0 (and higher). *FX135, or its OSBYTE equivalent, comes to the rescue!

The following function performs the required operation:–

```
10 DEF FN screen (x, y)
20 LOCAL A%
30 VDU31, x, y
40 A% = 135
50 = (USR (&FFF4) AND &FFFF) DIV &100
```

It should be noted that this will also set the text cursor to x, y. If this effect is undesirable try modifying the routine on page 432 of the User Guide.

K Wolstenholme,
Deansgate, Manchester

Boolean logic links your lines

The lack of multi-statement lines on the Sinclair ZX81 can prove infuriating at times. However, by using the computer's Boolean logic, a similar effect can be produced. For example, this line:–

```
IF P = 1 THEN PRINT A$: IF P = 3 THEN PRINT B$: IF P = 5 THEN PRINT C$
```

could be replaced on the 81 by:–

```
PRINT (A$ AND P = 1) + (B$ AND P = 3) + (C$ AND P = 5)
```

You can easily adapt and elaborate this idea to perform other IF–THEN routines. Another example shows how the value of X alters, depending on key depression:–

```
LET X = X + (INKEY$ = "A") – (INKEY$ = "B") + (10 AND INKEY$ = "C") – (10 AND INKEY$ = "D")
```

This means:–

```
IF INKEY$ = "A" THEN LET X = X + 1: IF INKEY$ = "B" THEN LET X = X – 1:
IF INKEY$ = "C" THEN LET X = X + 10: IF INKEY$ = "D" THEN LET X = X – 10
```

Boolean logic can also be used to imitate the ELSE statement. The line:–

```
IF Z$ = "SINCLAIR" THEN PRINT "CORRECT" ELSE PRINT "WRONG"
```

can be imitated by:–

```
PRINT ("CORRECT" AND Z$ = "SINCLAIR") + ("WRONG" AND Z$ <> "SINCLAIR")
```

J R Mortleman
South Woodford, London

Can the scan on the TI99/4(A)

When using extended Basic for the TI99/4 (A) the computer does not allow FOR–NEXT statements after IF–THEN–ELSE, ie:–

```
100 IF A = B THEN 200 ELSE NEXT T
or
100 IF A = B THEN 200 ELSE FOR T = 1 TO 10 :: NEXT T
```

The computer pre-scans the whole program, setting up memory for variables etc and finding any errors, and in doing so, discovers the above.

However, the pre-scan can be switched off (as mentioned in the extended Basic info) using! @ P– and ! @ P+ in the program, but any variables or sub-programs used in the section which is not pre-scanned must be used elsewhere.

So the following routine will work:–

```
10 A = 0: B = 1
20 ! @ P–
30 IF B = 1 THEN FOR A = 1 TO 10 :: B = B * A :: PRINT B :: NEXT A
```

Even the control variable must be used elsewhere in the program, so it's included in the pre-scan. The extended Basic book does not mention this fact, and just says you cannot have FOR or NEXT statements after THEN or ELSE.

Stephen Godfrey,
Hayling Island,
Hampshire

CHAIN your listings down

Here is a way of stopping people LISTing your Basic programs on the BBC. However, it needs your program to be RUNning, so I suggest you CHAIN your main program from a small initialising routine. Then make the first two lines of your program:–

```
1 ON ERROR RUN
2L*KEY10 1 ON ERROR GOTO 2|M2 GOTO 2|MRUN|M
```

Line 1 makes sure the program cannot be stopped using Escape, and line 2 defines the Break key to having its own autoRUNning program. Once the Break key has been pressed, the only thing to do is switch the computer off.

I Wrigley,
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SYNTHESIS FINALE

Following our reviews on speech packs, PCN talks you through the route to voice synthesis.

Commanding voice

We've spoken of DCP Speechpacks, Chatterboxes, SAMs and Supertalkers, but the talking really begins on how these peripherals and software packages work.

The speech synthesis packages we've reviewed in the last four issues will run on the Sinclair Spectrum and ZX81, Vic-20, Apple II and anything with an RS232 interface. But if you understand the principles behind speech synthesis, you can put words in the mouth of any micro.

Understanding the principles starts with your own mouth. Contortions of vocal chords, lips, tongue, cheeks and teeth produce 64 basic sounds. The word for these sounds is phoneme, and by combining phonemes you get words.

Chip manufacturers have devised a method of storing the information that will produce phonemes on the silicon chips that plug into your micro as a voice synthesiser.

Taking the phonemes stored on the chip and turning them into words is the next challenge. It is actually met by plugging in ROM (Read Only Memory) chips on which is held a short list of the most commonly used words in computer-to-user conversation. This list is, of course, limited by the capacity of the chip and the words are numbered so you can access them easily.

You can access the phonemes directly yourself, but it is a time-consuming and frustrating way to try and build a vocabulary on your micro.

The easiest route to speech on your computer is to add yet another program to the first system (with words stored in ROM) and instruct it to take normally written words, convert them to phonemes and spit them back out as words.

Once you've developed your own speech synthesis system, you can start to incorporate speech into your program.

Prompt response

Voice commands and prompts can be especially useful in getting critical pieces of information to the brain before disaster strikes; so there's a good argument to be made for using them sparingly, or at least, if possible, changing the inflection of the voice to convey urgency.

Prompts like 'no disk in drive A' or 'I am

Below: a sketch code diagram for a program designed to gather all the necessary commands for sending voice synthesis to pre-processing as well as to peripherals.

```
(* SDL listing

(*   Program

WHILE not finished
     ...
     ...
     set PARAMETERS(for each wanted device, for each parameter)
     DO I/O routine                           (* CALL, GOSUB, PROC etc.
     ...
     ...
clear up the mess
prepare for next program
exit

(*   I/O Routine
(*      Despatcher

IF DFLAG > 0
THEN

(*      Error-trap
(* if there's any value at all in EFLAG

THEN IF EFLAG > 0

(*      Error-handler

(* then we had some problem, so make sure we can tidy up after we report

     THEN save current PARAMETERS(error-report-device)

(* make sure we don't mess up whatever we've already done

          reset PARAMETERS(error-report-device) to special values

(* Say what happened

          IF ABORTFLAG is set
          THEN print "Aborted output"
          ELSE print "Error on output"

(* Where

          print " to " DEVICE$(EDNUM) " : "

(* What was wrong

          print PARAMNAME$(EDNUM,EPNUM)
          print EPVAL " is too "

(* How it was wrong

          print ERRORNAME$(EFLAG)"."

(* but if it wasn't fatal, what we did about it

          IF ABORTFLAG is not set
          THEN print "Default value "
               print LOCAL(EPNUM) " used."

(* Tidy up the mess

          unset Bit(EDNUM) in DFLAG       (* because we've finished with
                                          (* this device
          unset ABORTFLAG
          unset EDNUM
          unset EPNUM
          unset EPVAL

(*      Guard 1

          IF bit(device) is set in DFLAG (* meaning we want this device

(*      Checker

          THEN do any neccessary pre-processing (* Up to you

(* Here's a really horrible bit. You have to catch everything that
(* could conceivably be wrong, so this is in fact a whole slab of
(* IF...THEN...ELSE IF... or
(* CASE...A...B...C... statements

          IF PARAM(device,param number) and LOCAL(param number) are wrong
               THEN set EFLAG to say "what's wrong"

(* Same again, but just for the local copy this time

               IF LOCAL(param number) is wrong
               THEN set top bit of EFLAG   (* to show that local copy
                                           (*  was bad too
               set EVNUM to parameter number
               set EDNUM to device
               set EPVAL to PARAM(device,param number)

(* Here's the other really horrible bit. You have to catch everything that
(* would really cause a problem, so this is a whole slab of
(* IF...ELSE IF... statements with a single
(* THEN at the end

          IF EFLAG set and an error would be fatal (* don't...
                                                   (*  write to disc
                                                   (*  overplot graph-axes
                                                   (*  ...?
          THEN set ABORTFLAG
          IF ABORTFLAG is not set and EFLAG is not set (* everything's OK
          THEN set LOCAL(param number) to PARAM(device,param number)
          do any neccessary post-processing        (* also up to you

(* Guard 2

          IF ABORTFLAG is not set           (* No problems found
          THEN jump to Device Handler       (* How will depend on machine,
                                            (* language, operating system,
                                            (* and so on

DATA STRUCTURES

PARAM(device 0..7, maximum number of parameters)
LOCAL(maximum number of parameters)
ERRORNAME$(for each type of error)
PARAMNAME$(device 0..7, for each parameter)

CONTROL VARIABLES

DFLAG   if this has a value, then each bit set means a device we want which
          has not been handled yet

ABORTFLAG        any value means a serious error occurred

error-report device     the device to which error-messages are to be sent
                        if this is Zero, then don't bother

special values          which make sure that reporting an error won't mess
                        things up too much. Print in special area of
                        screen if possible, or ignore

ERROR VALUES

EFLAG   if this has a value, then a problem occurred
                     value of EFLAG says what the problem was
                     if EFLAG > 127 then the default was bad too

EDNUM   Number of device which had problem

EPNUM   Number of parameter which was wrong

EPVAL   Value which caused problem
```

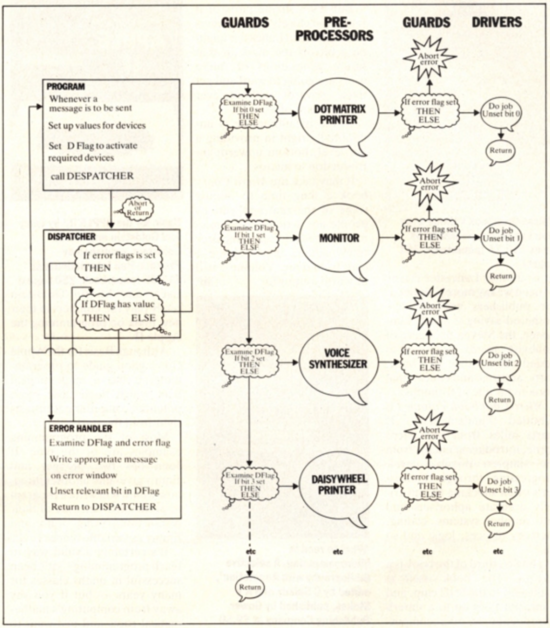
FLOW-CHART: A rigorous series of error traps

The first set of guards are actually selectors. They ask the question 'Is my bit set?' If it is then the guard passes, and the flow diverts into the associated checker. If it fails, the following guard is tried.

The checker-routines are bound to be pretty nasty. Since each device must be driven differently, you have a lot of IF . . . THEN or CASE-type statements which examine each possible mistake in each parameter. An appropriate action is taken in each case, which may mean an abort. EFLAG is set so that the error-handler can find out what went wrong.

Of course, you don't want to abort if you don't have to, so the thing to watch out for is the chance to use some sensible value instead of aborting, but care is needed in deciding when to do this.

The second set of guards are where the question 'Do you have a valid set of parameters?' is asked. Since the actual drivers are very fragile, and *must* be given accurate data, you arrange to abort back to the dispatcher if ever this is not true.



just about to clear file' could be capable of eliciting a prompt response during a long session when messages appearing quietly in the corner of the screen no longer have any impact.

There are already a number of sound prompts built into many micros which could be changed to actual voice commands.

On the Apple, the boot-up beep could be changed to something imaginative like 'you're on', the tick-tick of Oric keys as you press them could be changed to read the letters off as you press them (with an option to silence them if they got too annoying).

Even the Epson MX80F/T printer, which currently elicits a loud beep when you run out of paper, could be changed to say something about needing paper. If the computer is connected to read the status of the printer, this could be accomplished quite easily. Unfortunately, most computer/printer discussion is pretty much a one-way affair.

If you add music to the speech synthesis you could have it sing accompaniment to your favourite songs, allowing for changes in pitch adjustment and keys.

'Handlers'

Everyone should find a sound level appropriate to their own needs, but there are a few tricks of the trade worth conveying.

When you're writing any program, it's a good idea to put all your input/output controlling routines in one place instead of dotting them through the code.

For example, instead of using constructions like:–

CLS: INK GREEN: PRINT "HELLO": NAME $

and then later in the program:–

INK RED: PRINT "Goodbye"; NAME $

it would be easier to define a subroutine or procedure to handle things and to send it a message telling it what to do.

This would provide several benefits. For one thing any changes or extensions need to be done only once — you don't have to change lots of not-quite-identical lines since the values that you're sending won't alter.

There's another benefit, and that can be summed up in the statement 'RE-DIRECTED OUTPUT' — what this means is that by sending the same values to different routines you can control different devices.

For example, if you have a voice synthesis card, then by gathering all the needed commands (which are probably quite complex) as well as any necessary pre-processing together, and doing the same thing for the screen, printer and any other devices, you can send the message to the screen, voice card, printer or whatever.

This can be accomplished simply by sending one extra value which will trigger the required device-controlling sub-program.

Such sub-routines are often called 'handlers' — now you know why.

A 'sketch code' design for a program which is constructed in this way is reproduced opposite.

Every week in Readout we print reviews of a selection of the latest micro titles.



'Micro Cookbook Volume 1' by Don Lancaster, published by Sams £12.75 (paperback, 381 pages)

'It is another Lancaster classic — need we say more?'. Indeed, the publishers needn't have bothered saying it at all. Lancaster, the Steven Spielberg of hobbyist micro books, has added yet another laid back, witty, accurate and educational book to his pile of triumphs.

Micro Cookbook Volume 1 is subtitled 'Fundamentals'. It starts miles from the micro scene, introducing micros from the simplest possible level, progressing through Lancaster's often shocking but invariably accurate aphorisms and into number systems, coding, memory devices, logic and so on.

The first third of the book is a scream. The book itself is dedicated to the 6502 chip, and Lancaster goes on to a superb introduction to microcomputing with a continued fun-poke at such justifiable targets as 8080s, dino computers, old-line publishers and cynics.

If you really are new to microcomputing, you'll miss many of the funnies. But you still get wise and practical information in easy-to-understand American.

Following this Lancaster plunges into the serious side of microcomputing fundamentals. It's rather like a teacher who jokes with his class before landing them with their homework.

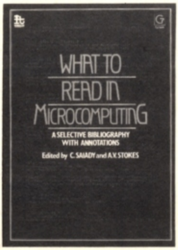
It's still light hearted but the 'Doing it' boxes have changed from 'Show how to get the Oyster slobbering contentedly in the Pyramid of Doom' to 'show how you can build a hold-follow latch out of an inverter and four NAND gates'.

The *Micro Cookbook* is an ideal introduction for those prepared to get their hands dirty, and who want to get the most from microcomputers.

But it's a shame parts of it relate too closely to the American scene, and Lancaster might be a bit off the mark in that future generations of micro users are going to want and get those rewards without ever having heard of a 6502.

In the meantime, he is undoubtedly right in providing a gut level, bottom upwards introduction to micros.

It may take the *Micro Cookbook* a long time to discuss some of the real applications people are actually using micros for today, but Lancaster freely admits that Volume 1 ends in mid air. Volume 2 will be worth waiting for. **MP**



'What to read in Microcomputing, A selective Bibliography with Annotation', edited by C Saiady and A V Stokes, published by Gower Publishing Company at £9.50 (paperback 103 pages)

This is an admirable attempt to unravel the complexities of book buying for the micro user. It's just as its name implies — a list of many — the authors say more than 400 — of the books available.

It separates books into four main categories — background, languages, specific micros and hardware and software — and goes on to list them by publisher, author and title with occasional comments on who would find them useful.

It is a good guide to what's available — 26 titles beginning 'Basic. . .' for instance — but in many cases goes little further in helping you sort through them.

At £9.50 it's reasonably costly but it puts the micro book market into perspective with the intention, as its editors say in the introduction, to give micro users an idea of what's available, on what.



Basic for the APPLE II,' by Larry Joel Goldstein and Martin Goldstein, published by Prentice-Hall International at £11.95 (paperback, 250 pages)

Larry and Martin Goldstein really play the numbers in their new book on programming the Apple II.

Although Basic for the Apple II is a good guide to programming, it has a mathematical bent which might lose some potential computer enthusiasts right from the start.

Most of the programming examples are of the type 'If John has two oranges and Jimmy gives him another three, how would you write a program to predict the outcome of their transaction, using John and Jimmy as variable names?'.

It's certainly a valid way to teach programming — it's been successful in maths classes for many years — but if you shy away from computing's mathematical roots and just want to know how to apply the wonderful mathematical basics of a computer, you'd be tempted to skip ahead several chapters in this book.

'Fun' bits of programming, like graphics and sound, are not dealt with until halfway through the book, by which time the fair-weather programmer may have given up on it and moved onto some other book which tells in the first chapter how to make your own space invader move across the screen.

Like any good programming book, there are things to do in this one, but in the beginning those tasks tend toward the boring and in the end toward the complex.

In its favour, it can be said that anyone with an abiding desire to give themselves a good grounding in computing on the Apple will find *Basic for the Apple II* an extrmely useful tool.

From the beginning, the authors take pains to go through various programming commands and re-inforce the reader's knowledge of those commands with endless testing exercises.

The structure is logical and well-presented, but as I said earlier, it might be a bit too plodding for the impatient programmer.

In all, however, it would be a welcome addition to most beginning programmers' libraries on the Apple. **RK**



'Computer Languages and their Uses' by Garry Marshall, published by Granada at £5.95 (paperback, 108)

No-one can say this book alienates the newcomers. With the opening line 'A computer language is a language for communication with a computer' it quite clearly takes a stand among the not-too-advanced users.

But its premis is worthy, taking you through Basic and out the other side to Prolog, Gino-F, Comal and Lisp.

There's discussion of language development before a comparison of Basic with the other languages and explanation of how they can be used with data-bases, 3-D graphics, simulation and Pixel graphics.

Program listing and diagrams add clarity to the instructions and techniques are explained and reviewed.

The author makes no pretence that he's out to break the Basic barrier. And he does so in a light and easy way that will give even new users — perhaps especially the newcomers — a broad understanding of what they can do with their microcomputers.

If you want to go beyond Basic, this might be the place to start. **CM**

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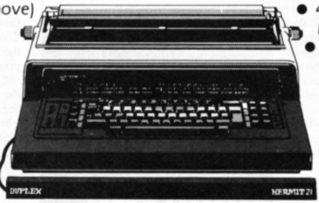
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Advice from Brian Dexter to sharpen up your eye for the best buy in colour units.

Selecting a colour monitor is more like choosing a pair of speakers for your hi-fi system than choosing a memory extension for your computer. Seeing it in action is the only real test.

But there are few standards to measure monitors against. Manufacturers can even boast of their 'super high resolution models' — which on examination turn out to perform worse than the medium resolution models offered by other manufacturers.

In preparing this guide to testing colour monitors, I have taken each monitor in turn, and suggested ways in which its overall effect on the finished picture can be evaluated.

There is no single standard of colour output from micros (see chart 1 for details). If your computer output is the European TV standard PAL, the quality of the final picture will be restricted in terms of its colour saturation and sharpness of delineation between any two colours.

You will find that you begin to suffer from eye-strain.

But if your computer has RGB — red, green and blue — output, it is the monitor and not your computer output which will limit the quality of the final picture.

As with hi-fi, you need to match the input characters of your monitor to the output characters of your computer.

The most common compromise is when you use a linear input monitor on a TTL (Transistor-Transistor Logic) output computer. The resultant colours will not be as vibrant or as stable, so you must ensure that the monitor does not have a linear input.

Read the technical specifications, or ask the dealer if it's capable of showing more than seven colours. If it is, don't buy it.

If electronic monitor manufacturers' advertising is to be believed, the band-width is the only stumbling block. But the standards used by various manufacturers for measuring band-width are not consistent, and must not form part of your evaluation.

For a given quality of display tube, the performance of the electronics can best be assured by typing three rows of 'm's in white text across the screen, at the top, middle and bottom. If possible, you should do this in both 40- and 80-column text. Stand back and look at the overall result. Things you should check at this stage include:

- Are the lines straight and horizontal?
- Are the characters as clear in the corners of the screen as they are in the centre? You may find that the text in the corners splits into the three primary colours, and this shows that the tube guns are not properly aligned. These are factory pre-set, and are not adjustable by you or your dealer.
- Are all the characters of equal size, and do they fill the screen? If they are not exactly central, your dealer should adjust this for you.
- Look carefully at the edges of some of the letters in the middle of the screen. Do they look sharp or are they blending into the background? If the latter is true, you will suffer from eye strain if you use the monitor for an extended period.

Display tubes are described in all sorts of ways, from true 80 column through 0.62mm phosphor dot pitch (pdp), to 452 pixels. All of these describe the same thing.

Does your monitor pass the screen test?

The front surface of colour tubes is made up of little triads, consisting of one red, one blue and one green phosphor dot. The distance from one triad to the next horizontally on the screen is called the phosphor dot pitch of pixel spacing.

Any character you wish to put on the screen requires a minimum of seven pixel dots if it is to be portrayed clearly. So for 80-column text you would require $7 \times 80 = 560$ pixels across the screen. As you require some margins, a more accurate figure would be 608 pixels. Half of this would be required for 40-column text.

To convert pixel dot spacings from the manufacturer's data sheet to the number of pixels across the screen, you have to know the size of the tube. Tube sizes are not measured horizontally, but diagonally. And sizes are measured in inches, with pdp in mm. To determine the number of characters on a particular tube, use the following formula:

$$\frac{\text{Screen size in inches} \times 2.61}{\text{Phosphor dot pitch in mm}}$$

The result for most standard resolution tubes (0.62mm pdp) is 50 characters for 12in tubes, and 59 characters for 14in tubes. These figures relate to worst-case characters, which are 'm's and 'w's. So a good 14in, 0.62mm pdp (452 pixels) monitor should support 80-column text, where only occasional 80-column use is required.

On the 12in version, the number of pixels is reduced to 380. So you will find that this is not suitable for 80-column text. To achieve true 80-column performance, the tube must have a minimum of 608 pixels.

Colour monitors vary considerably in the amount of power they consume when the screen is changed from predominantly white to predominantly black. Most colour monitors do not have adequate power supplies to support this changing demand without a drop in output voltage and consequent shrinking in the screen size.

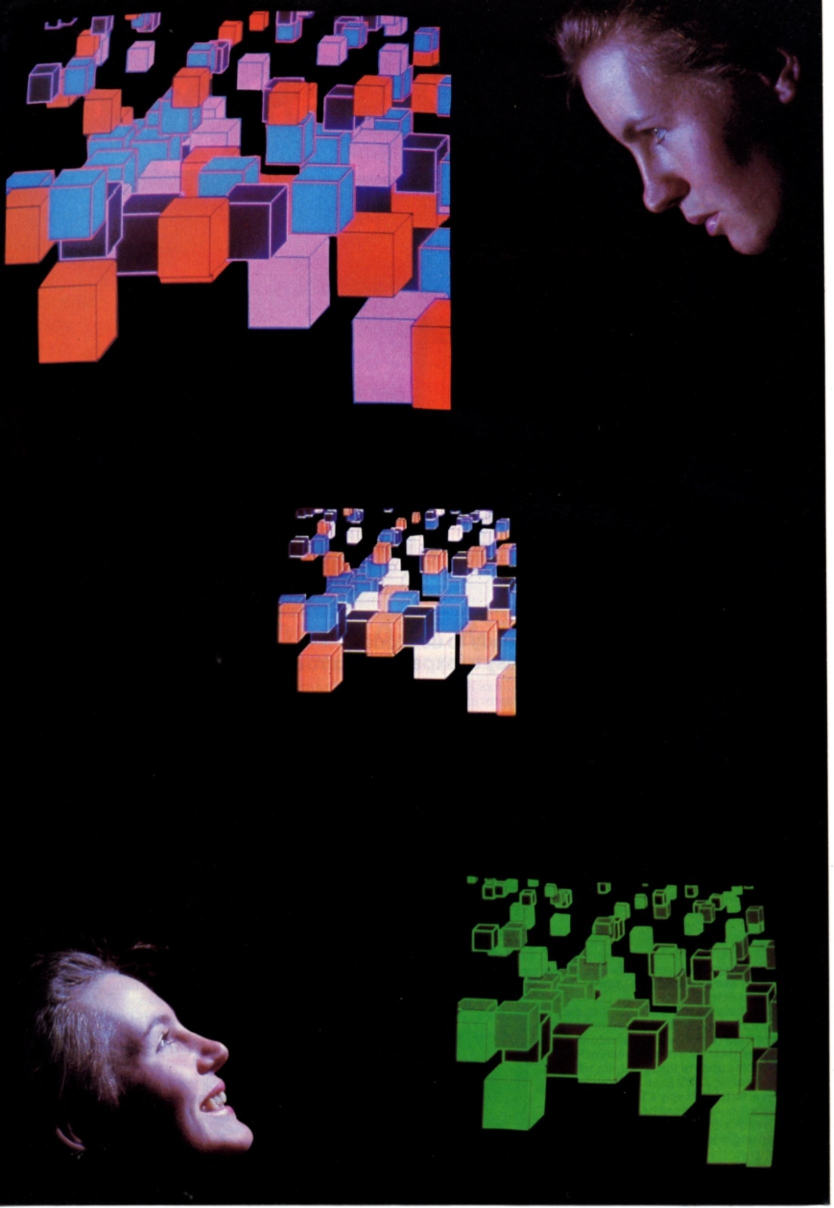
The effect is best seen by setting up a screen with a vertical reference line in the left-hand margin, and then alternating the rest of the screen between white and black. Look very closely at the reference line. As the colour changes, the line will move inwards and outwards. If the movement exceeds 1mm, you can be certain that the power supply is degrading your picture quality.

You may feel that, in particular applications, you will not be exercising your monitor in this way, but the test highlights the power supply's contribution to the sharpness of the picture.

Once you're satisfied that the monitor performs well, RUN some software you are familiar with. You can then compare your results with those from previous equipment. The software should exercise the full colour options on your computer as well as test the highest resolution graphics.

Another useful test is to list one of your programs so that you can see whether the text is readable. If you're buying the monitor for educational use, remember the safety standards under BEAB regulations. It is important that the colour monitor conforms to these requirements, particularly as it has over 22,000 volts inside.

Typical Computer Outputs	Typical Computers
Composite Video, PAL	ATARI, DRAGON
3 wire — red green, blue TTL with separate sync.	BBC, 480Z, ORIC
3 wire — red green blue, 3 volt high impedence linear with separate sync	APPLE II
3 wire — red green blue with or without sync on green, 75 ohm 12 volt linear output.	DEC PC, 380Z
4 wire — plus separate sync TTL output.	APPLE III, IBM PC



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Key features of the Sinclair ZX Spectrum

- Full colour – 8 colours each for foreground, background and border, plus flashing and brightness-intensity control.
- Sound – BEEP command with variable pitch and duration.
- Massive RAM – 16K or 48K.
- Full-size moving-key keyboard – all keys at normal typewriter pitch, with repeat facility on each key.
- High-resolution – 256 dots horizontally x 192 vertically, each individually addressable for true high-resolution graphics.
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This module incorporates the three unctions of Microdrive controller, local rea network, and RS232 interface. Connect it to your Spectrum and you can ontrol up to eight Microdrives, ommunicate with other computers, and rive a wide range of printers.

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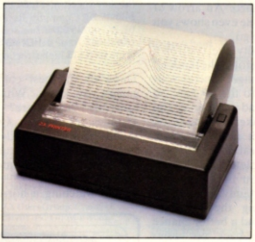
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The ZX Printer – available now

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AT THE RACES

DRAGON 32

Behind the wheel

NAME Grand Prix **SYSTEM** Dragon 32 (+1 or 2 joysticks) **PRICE** £7.95 **PUBLISHER** Salamander Software 0273-771942 **FORMAT** Cassette **LANGUAGE** Basic **OTHER VERSIONS** Tandy shortly **OUTLETS** Mail order, Spectrum shops, and other dealers

The quality of driving skill games in arcades is now so realistic you almost expect to see the machines lurch into gear and set off down the street, and while home micros can't compete at that level yet, it's inevitable that comparisons will be made.

Grand Prix is a long way from being an arcade-style game, where the road comes hurtling up at you, but offers you a view of the race and is more like a computerised version of Scalextrik.

Objectives

The game is for one or two players, and you use your joystick control to move your dot of a car round a bird's eye view of one of the world's Grand Prix circuits. Your fire-button serves as accelerator, and if there's no opponent handy you can race against the clock, which is a constant real-time display at the top of the screen.

First impressions

Salamander software is well presented, in a sturdy plastic box, and Grand Prix comes with a fully detailed instruction sheet. Not that you really need it, as the game's about as hard to operate as a light switch.

In play

After an introductory burst of music and a chequered flag, you'll be asked to choose a difficulty level (0-9), number of laps (1-9), number of players, and the track you want to race on.

There are eight of these, from simple circuits like Indianapolis and Monza, to trickier ones such as Monaco. An arrow at the starting line even shows you which way to go.

The difficulty level controls a number of factors. The harder it is then the longer it takes your car to react to the joystick, so thinking ahead is essential, and there's also likely to be more oil on the track (blue patches), which may cause you to lose control completely for a while.

And if you crash the car, which is certainly more likely than crashing the program, then you stand a better chance of bouncing back on easier levels.

Having successfully completed the race you earn points according to time taken, difficulty and track used, with a bonus for winning (tactical hint: this is easier with one player. But only just) and with penalties deducted for crashing.

An amusing high-score table starts you off at the bottom and moves you up till you find your place in the rankings.

Verdict

There's nothing too much wrong with this game, but then there's not a lot to get excited about either. I did find the cars slow to react to the joystick, even when that wasn't meant to be the case, and it's also tricky to keep the fire-button permanently pressed for acceleration while moving the stick at the same time. A not-so-Grand Prix.

Mike Gerrard

RATING
Lasting appeal —
Playability —
Use of machine —
Overall value —



SINCLAIR SPECTRUM

Punter's progress

NAME Derby Day **SYSTEM** 48K Sinclair Spectrum **PRICE** £5.95 **PUBLISHER** Computer Rentals 01-247 9004 **FORMAT** cassette **LANGUAGE** Basic **OTHER VERSIONS** none **OUTLETS** high street dealers

Think of the best computer games you know. What features do they share? Good graphics, of course. Colour, sound, speed, naturally. But surely an essential feature is a constant, demanding interface with the machine.

And watching a horse race just can't count as that.

Objectives

Excellent music introduces you to the racecourse. You are then presented with a portrait of a bookie called 'Honest Clive Spectrum' — though he looks too happy to be *really* happy — and you are of course invited to bet on a field of amusingly named nags.

Up to five punters can lose at once, and there is an ingenious choice of different betting systems available. Your ditherings are accompanied by the sharky smile of Honest Clive and a pretty good representation of the horses trotting round the enclosure.

In play

Once you've bet, your active participation is over, and more good music accompanies a view of the field poised to go. The starter drops his flag, and they're off. The display of the race has to be good since the player now has nothing to do but watch it. In Derby Day it's adequate.

The horses gallop in a jerky slow motion across the screen, the dead-straight track scrolling left around them. There is some attempt to convey the thunder of hoof-beats, and the race is watched by amusing groups of spectators.

Problems arise, however, when the horses reach the home straight. The cassette insert claims that this part of the race is displayed in slow motion. What this means is that the scenery stops moving. The horses actually go slightly faster.

The winning horse is named and there are occasional photographs for places.



Verdict

This isn't an original idea, and not one that seems particularly well-suited for a computer game. The music is good but the only commedation I can think of is, it will please people who like this sort of thing.

William John

RATINGS
Lasting appeal —
Playability —
Use of machine —
Overall value —

ZX81-16K/DRAGON 32/BBC A+B
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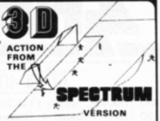
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IF YOU have always wanted to manage a football team, FOOTBALL MANAGER, *from Addictive Games, is for you — The game is ideal for a football fanatic but the most interesting thing for us was the 3-D graphics used to create the goalmouth action — the game is a winner.*
SINCLAIR USER FEBRUARY 1983

Although I'm no great football fan, I really enjoyed playing this game — excellent use is made of colour and user-defined graphics. The game is very logically put together, so that the development of strategy and tactics has a real effect. For example, one of my teams got through to the fourth round of the F.A. Cup where it was beaten by a second division side. This upset morale and meant that our promotion bid failed. Perhaps I should have given up the F.A. Cup run and held some good players back — the possibilities are endless. Brian Clough had better watch out!
ZX COMPUTING FEB/MARCH 1983

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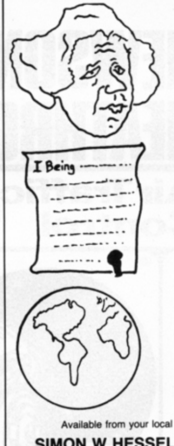
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GAMEPLAY

ADVENTURE

APPLE

Dead men tell tales

Name Deadline **Application** Adventure game **System** Apple II **Price** £35.95 **Publisher** Infocom **Format** Disk **Language** m/code **Other versions** IBM **Outlets** Pete and Pam 0706 227011, mail order, IBM and Apple dealers

If you've ever had a yen to be Sherlock Holmes or Hercule Poirot, this is the adventure for you. Deadline is an adventure game in the classic mould — text only, no graphic distractions — but with a difference. Rather than exploring a colossal cave or haunted mansion, you explore the means and motivations of a cast of suspicious characters, and you get to clap handcuffs on the one you decide is guilty of murder.

Objective

Wealthy industrialist Marshall Robner is found dead on the floor of his locked library, killed by an overdose of Ebullion. You are Detective Anderson of the Laveville Police Department; your brief is to investigate the murder and bring the culprit to trial.

You are free to explore the Robner mansion and its grounds, and you can question the Robner household and examine any objects you may find. Your assistant, Sergeant Duffy, will take evidence away to the police lab to be analysed.

You may wait in a particular spot and allow time to pass until the person you wish to meet comes along, but there is one snag — you have only 12 hours (Deadline time, not real-world time) in which to solve the murder.

First impressions

The packaging on this one is pretty slick. You get an Inspector's Casebook filled with playing instructions and a glossary of commands you can use — including the very useful SCRIPT and UNSCRIPT, which let you produce (or turn off) a printout of everything that takes place. You also get a set of interviews with the main members of the household, to get you started.

There's a photo of the chalked outline of the corpse on the library floor, a coroner's report, a report from the police lab, which has analysed the victim's teacup . . . and the whole lot comes in a tough brown file.

The only thing missing is a map of the house, which would be very useful indeed — the Zork Users Group will sell you one if you wish.

In play

This is a pretty sophisticated adventure, make no mistake. Forget those crude TAKE BOTTLE, KILL SNAKE commands that most adventures understand — with Deadline you'll find you must use commands such as MRS ROBNER, TELL ME ABOUT THE MURDER, or MS DUNBAR, GIVE ME THE BOOK.





Inspector Anderson's Casebook — the portfolio that launches you into your Deadline investigation.

I found that a prize pain, because I don't type very fast or accurately. And all the while time was passing in Deadline's world, I was wasting it by asking questions with typing errors in them, and getting back, 'THE WORD "TEL" ISN'T IN YOUR VOCABULARY'.

There are other complications. Your suspects have a life of their own, unlike most of the wizened dwarves and dark shrouded figures in other adventures. They move about the house as time passes, and although you may be desperate to ask Mr Baxter a key question on which the whole case hinges, first you have to find him.

The Robner household won't necessarily behave in the same way from one run of the game to the next, either. The first time I played, everyone turned up for the reading of the will, which started several minutes early.

The second time, Mrs Robner failed to show up at all, and when I tracked her down, she resolutely refused to move from where she was.

Deadline characters will lie through their teeth at you. They will happily fail to understand commands which, according to the instructions, they are supposed to understand. In fact, I never managed to get any character to respond to HAVE YOU SEEN? or SHOW ME.

The answers they give to your questions will also depend on what leg-work you have done beforehand, so it's no use doing a bit of heavy investigation the first time you play and then trying to skip that the next time round. The only way round it is to SAVE the game when you feel like a break, then restart it later.

Otherwise, when you ask Mr McNabb to tell you about the rose-bed, he will stare at you blankly and make it quite clear he has no idea what you are talking about. First you have to investigate . . . well, try it for yourself.

Some of your suspects are pretty nasty pieces of work. There is sullen George, the black-sheep son: 'Look, man. I'm not going to lie to you and tell you I loved him, right?' There is the stuffy Mr Baxter: 'I've known the boy for some time, and believe me, he's no good.' Gabby Mrs Rourke, the housekeeper: 'What do you know? 'A murder. Here! A whole batch of suspects, this group here.' Surly Mrs Robner: 'This is surely all a terrible waste of time.' And efficient Ms Dunbar: 'Mr Baxter is, of course, an excellent executive.' These all make up the Robner household, along with the occasional gardener and lawyer.

There are occasional jokes, usually on you. If you bump into George eating breakfast and ask him to show you what he's eating, you'll find that it's herrings. Red ones.

I never got as far as the trial scene. You need to have a fair bit of heavy evidence to get your case to court, since you must prove motive, means and opportunity for your chosen suspect — and in a house with a creaking staircase and a locked library door, that isn't all that straightforward.

But succeed or fail, the game ends when you take the plunge and arrest somebody. You'll either move on to the trial, and be told the outcome, or you'll be told your evidence just isn't good enough to convict. If so, then it's back to square one — so be sure to SAVE the game before you make an arrest.

Verdict

Even if you do fail once or many times, this is a game you can play again and again, because there are any number of possible solutions, depending on the evidence you collect and what you do with it.

Shirley Fawcett

RATING
Lasting appeal — 5/5
Playability — 3/5
Use of machine — 2/5
Overall value — 4/5

The 700 series — Commodore's top model — has been a long time coming. Hands-on for Karl Dallas.

Commodore 700

The promise of Commodore's new top-of-the-range 700 business computer has been tantalising us for months now. In its ultimate form, it should have 960K memory, a second 8088 processor running CP/M and similar, with the possibility of running other languages such as Fortran and Cobol, integral double-sided single density disk drives, offering 340K per disk and a much greater speed of access for data since they will work on the direct memory access principle.

Of course, the computer business being the computer business, the ultimate form isn't yet available, though rumour has it there is a dual-processor 700 up and running on a test bed somewhere in darkest Slough.

Commodore has been promising us a machine for review since it was launched with such song and dance at the Birmingham computer show in January. The machines have been selling since the big February dealer shows, supported by nationwide advertising. When we finally got a review machine from the country's biggest CBM dealer, Adda, the reason for this shilly-shallying became obvious: the manuals aren't ready.

We could have waited a month until they became available — though a computer manufacturer's month bears as much relationship to 31 days as a countryman's 'mile' — we decided to go ahead manual-less on the basis that many people want to know what they can do with the £1,300-worth of pretty hardware.

Well, despite the fact that trying to make a computer perform without a manual is rather like trying to decipher the Rosetta stone without knowing the languages on its three sides, what follows might help in deciphering what could be the best realisation yet of the concepts embodied in the original 4K PET 2001 of 1977.

Because most Commodore machines are upwards compatible (well, fairly), meaning that what runs on a lesser model will probably also work on a greater, then anyone who owns as much as a humble Vic will be able to get the 700 to run simple programs, access its rather low-resolution graphics, and READ and WRITE to and from data files, since until the integral disk drives come along it is meant to link with the familiar 8050 and 8250 double disk drives that come with the previous top-of-the-range machines, the 8000 series.

If you're familiar with the Commodore 64 (and have worked through the 70-odd errata in its dreadful manual), you'll even be able to get the 700 to sing for its supper, since it uses the same three-voice nine-octave sound shapers as the 64, albeit from a different start address.

Construction

As delivered, the machine tested was actually the 715B, which comes with an 80-column green-and-black integral monitor with tilt and swivel adjustments, detachable keyboard connected by about 24in of curled cable plugging into a socket under the monitor, and 256K organised into four banks of memory. It is also available without monitor as the 700B for some £400 less, though I can't imagine there being much call for that configuration until the promised hi-res/colour card is available.

When it comes (don't hold your breath), the 340K, integral dual disks 750BX version with 8088 second processor is expected to cost just over £2,000.

Cosmetically, the 700s are a big improvement on the hard-edged familiar Pet shape we've come to know and love/hate, though while the Pets always had an air of a low budget sci-fi telly series about them, what is known in the designer game as Lime Grove cardboard, the new look (which has also been applied to the 8000 series) still seems to be trying to look futuristic, but in a more *Star Trek* manner than, say *Blake's Seven*.

Screen

The only thing I really didn't like about it was the screen. Using it alongside my faithful old CBM8000 series made me happy to get back from its rather glaring emerald to the less vivid, more turquoise-shaded phosphor of the old 'un.

And as for the new serif typeface, of which the company claims to be so proud ('specially designed characters . . . in a 9 by 14 pixel format . . . easier to read since they more closely resemble printed typefaces'), they can keep it because it also makes it easier to confuse the zero with an eight.

Keyboard

The keyboard has been completely redesigned, and while I was happy with my own 8096 keyboard, I must say the 700's is nicer to use. Also it can be detached from the main unit.

At the top left-hand corner are ten function keys, which are assigned to the following character strings on power-up (reading L-R, from F1 to F10): PRINT, LIST, LOAD, SAVE, OPEN, CLOSE, COPY, DIRECTORY, SCRATCH, and CHR$).

They can be reassigned, and the ten shifted function keys from 11 to 20 assigned by using the command:

KEY*nn, 'string'* [(+CHR$(13)]

The optional bit in square brackets adds a carriage return and therefore activates the string, if it's a command.

You can check what strings have been assigned to what keys by the direct command: KEY, which prints them to the screen.

Graphics characters are printed on the front of the normal qwerty keys, and also on some of the separate numeric keypad, which includes a double zero, calculator-style CE key for deleting all numerals since the last arithmetical operator in immediate mode in case of miskeying, an unshifted '?' for printing calculations to the screen, and its own ENTER key, which duplicates the RETURN key on the qwerty keyboard (ie, it can also be used for inputting program lines, as well as numeric calculations).

Incidentally the graphics characters on the numerics above the alpha keys are not the same as those printed on the keypad numerals.

Above the keypad are the CLR/HOME, OFF/RVS, and RUN/STOP keys which former Commodores had scattered to three corners of the qwerty keyboard, plus a fourth key, NORM/GRAPH, which switches between 'normal' (upper-and-lower case alphanumeric) and 'alternate' (capitals and graphic characters) character sets without using poke commands (which will still work).

Individual graphic symbols are supposed to be obtained by pressing CTRL and the relevant key, though I noticed strange effects: for instance CTRL/M seems to produce a carriage return rather than the left diagonal graphic indicated.

In place of the two cursor control keys on all Commodores until now — unshifted CSR right and down, shifted CSR left and 38▶



The screen swivels but, strangely, doesn't tilt. Underneath it is a blanking plate which is where the disk drives will go. The keyboard is detachable but when in place it appears as one unit with the monitor.



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34 up — there are four cursors, which makes more sense but will be confusing to those of us reared on earlier models.

In addition to the alphanumeric keys, two shifts and a shift lock (released by pressing the lock, not by pressing shift as is normal for typewriters, though this arrangement is 'normal' for Commodore), TAB and INS/DEL, there are also CTRL, the Commodore symbol key and ESC.

On the 64, the Commodore key is used mainly for colour changes (Commodore/1 = orange etc) but on the 700 its main function appears to be to control the flow of LISTed program lines.

codes is ESC Q, which will delete from the position of the cursor to next carriage return, which could be at the bottom of a screen-full of text.

ESC M will turn off the scrolling function, so when the screen has been filled, for instance during a LIST, the new lines will not come in at the bottom, scrolling the earlier lines off the top of the screen, but will skip to the top of the screen, overwriting the earliest lines displayed there.

The ESCape codes can be written into programs:
PRINT CHR$(127); *'control character'*.

which can then be PEEKed or POKEd, independent of anything which may have been done to another bank. BLOAD and BSAVE can be used to LOAD or SAVE a file to or from any memory location in the appropriate bank, using the optional directions for the beginning and end of information to be processed.

A typical BLOAD command would be:
BLOAD *'filename'*, D0, ON B2, P (*start address*).

Unlike some bank-switched memories, the previous bank switched retains a memory of where it was before the switch command was received, making it possible to switch back and forth without risk of serious error.

Data can be accessed from neighbouring banks in a manner entirely transparent to the user. Each bank contains two registers on zero page, the execution register and the indirection register, located at memory locations 0 and 2 in all banks.

The execution register tells the processor which bank it is getting its instructions from, while the indirection register tells it the register from which to fetch its data.

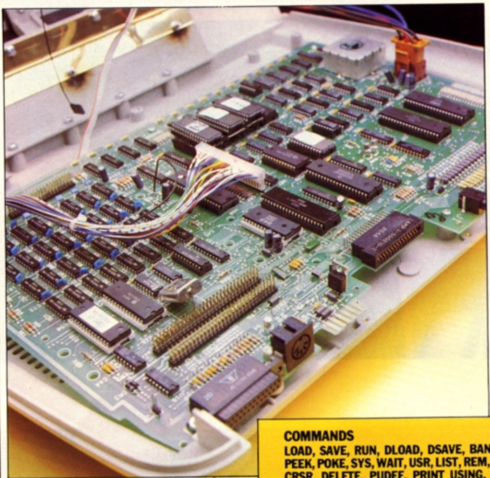
Thus the user has 64K for Basic text, 32K for simple variables, 64K for arrays, and 64K for strings.

A word about the monitor.

SYS4 will get you into it, as with previous CBMs, but X will no longer get you out. It will interpret X as a filename and register an I/O error.

I thought I had got out of the monitor by pressing the reset button on the back of the machine, since normal input was apparently resumed. But the function keys refused to work, and when I checked with Commodore it diagnosed a possible ROM error.

Apparently some 700s have been sold with faulty function key ROMs.



Ribbon cables are unknown and off-board connections don't have sockets.

COMMANDS
LOAD, SAVE, RUN, DLOAD, DSAVE, BANK, BLOAD, BSAVE, KEY, STOP, END, CONT, PEEK, POKE, SYS, WAIT, USR, LIST, REM, TAB, SPC, POS, CLR/HOME, INST/DEL, CTRL, CRSR, DELETE, PUDEF, PRINT USING, DIM, LEN, STR$, VAL, CHR$, ASC, LEFT$, RIGHT$, MID$, INSTRING, INPUT, GET, PRINT, DATA, READ, RESTORE, RESTORE (line), GOTO, IF . . . THEN, IF . . . ELSE, FOR . . . TO . . . NEXT, GOSUB, RETURN, ON . . . GOTO, ON . . . GOSUB, DISPOSE, TRAP, RESUME, ERR$, EL, ER, OPEN, CLOSE, DOPEN, DCLOSE, RECORD#, GET#, INPUT#, PRINT#, PRINT#, . . . USING.

Hitting the Commodore key during a LIST will stop the LISTing, which can then be viewed a line at a time by hitting the key another time. Alternatively, the LIST can be reimplemented by hitting any other key, and the scrolling slowed by holding down ESC. (That ESC key is not really an ESCape key, as a matter of fact.)

The obvious use of ESC on Commodores hitherto, when writing quoted sections within program lines, has been to get out of quotes, to use the cursor and other controls.

This is one thing ESC won't do on the 700: you have to type ESC followed by'O' (for "off). I'd find it easier to use a shifted RETURN and cursor up to the line again, but the reason for this is that ESC is now used to implement 26 different functions including, for instance, no less than four different cursor modes: flash/non-flash and solid/underscore. (Table gives complete list).

One of the more interesting ESCape

Operation

The alleged 256K memory of the 700 is organised into four banks of approximately 64K each, though if you activate the 'PRINT FRE(*n*)' command, where *n* is the bank number (FRE no longer takes a dummy argument), you will get 64089, 64253, 31487 and 64187 bytes free in banks 1-4 respectively because approximately 32K of bank three is dedicated to the integral DOS.

Nevertheless this is still just over 224K of memory.

Access is via the BANK command, which switches from one bank to the other, up to a maximum of 16 (if external RAM expansion packs are fitted). BANK [*bank number*] switches to the appropriate bank,

Actually, it wasn't faulty, because the way to get out of the monitor now is g8000, which provides a warm reset and re-enables the function keys, which pressure of the reset button won't.

The function key operation is something that bears watching. The demo I received of one of the few programs available, Anagram's Integrated Accounting and Stock Controller packages, required a switch off at the mains to re-enable them. This is something, I am told, that has been fixed in the commercial software, but it could be a bug source in self-written machine code programs using function keys.

Error Handling

Another group of new commands allows 41▶

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the programmer to bypass the machine's own error handling routines and set up his own, returning to the program with RESUME after the error has been dealt with, and avoiding that infuriating

?SYNTAX ERROR
READY.

by which previous machines have expressed disquiet at programming errors.

TRAP turns off the resident error-handling routine, passing it to ERR$ [*error message*] for screen display. EL and ER become reserved system variables, the former referring to the line number of the last error.

Finally, PUDEF defines a control string when used with the four-symbol formatting options available with the PRINT USING command, available for the first time on a Commodore machine. Unfortunately, I've been unable to find these in the machine, though a promised *Programmer's Reference Guide* will make all clear.

Most programs written in earlier versions of Commodore Basic will work on the 700, as long as they don't use any system-dependent POKE locations or contain machine code. Also, as already stated, ER and EL are now reserved variables.

Programs written on the 700 cannot be LOADed into any other CBM machine.

The time variable TI now refers to tenths of a second rather than 60ths, so the previous TI value = VAL(TI$)*6.

The 700 allows progam lines of up to 255 characters, rather than the previous limit of 80, which makes it possible to confine sizeable subroutines to a single line.

As I've said, also, the employment of SID (the 6581 sound interface device) means it can accommodate complex sound and music programs. The sound section of the Commodore 64 manual gives a comprehensive guide to how this can be used (E&OE!), bearing in mind that the POKE commands have to be changed by adding 1536 (by my calculations) since the sound function begins at $DA00.

The fact that the 700 has a socket marked RS232C on the back shouldn't fool you into thinking it can be plugged straight into any printer (for instance) or other device with RS232 socket, though it can be used if the built-in 6551 asynchronous communications interface adaptor chip, located at 56576 ($DD00) is programmed appropriately.

The Basic interpreter allows the user to open the RS232C channel and access it with standard input/output statements like any other channel.

Other specialised chips, located like the 6551 in bank 15, include the 6526 complex interface adaptor (56320/$DC00), and two 6525 tri-port interface chips at 56832 ($DE00) and 57088 ($DF00). In the time available I was unable to try all this out.

Verdict

The CBM700 series has amply fulfilled all I expected from it. It won't really be working at its full potential until it can use its dual processor option to run concurrently, employing the 6509 chip for communications with the outside world, and the 8088 for things like concurrent CP/M or MS.DOS, both of which I am assured are imminent.

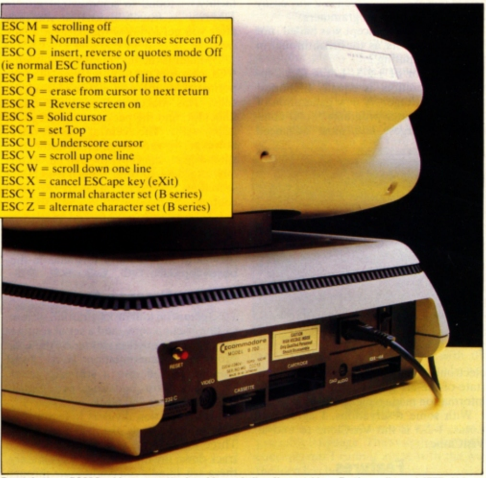
But even as it stands, it is a quantum jump above the capabilities of the CBM8096, and I would expect to find its memory banking much easier to use than the predecessor's almost impenetrable (to all but machine code addicts) extra memory.

Appropriate software is coming onto the market, including a really powerful version of Wordcraft, and I'd advise anyone wanting to upgrade from the CBM8032 to go straight to the 700, rather than messing about with 64K upgrades for the older machine, as I did.

'The CBM700 is a quantum jump above the capabilities of the CBM 8096'

CBM 700 ESCape functions

ESC A = Auto insert on
ESC B = set Bottom
ESC C = auto insert Cancel
ESC D = Delete line
ESC E = non-flashing cursor
ESC F = Flashing cursor
ESC G = bell on
ESC H = bell off
ESC I = Insert blank line
ESC J = move to start of line
ESC K = move to end of line
ESC L = scrolling on
ESC M = scrolling off
ESC N = Normal screen (reverse screen off)
ESC O = insert, reverse or quotes mode Off (ie normal ESC function)
ESC P = erase from start of line to cursor
ESC Q = erase from cursor to next return
ESC R = Reverse screen on
ESC S = Solid cursor
ESC T = set Top
ESC U = Underscore cursor
ESC V = scroll up one line
ESC W = scroll down one line
ESC X = cancel ESCape key (eXit)
ESC Y = normal character set (B series)
ESC Z = alternate character set (B series)



Reset button, RS232, video, cassette (would you believe!), cartridge, Earth, audio and IEEE 488 — connections in that order.

SPECIFICATION	
Price:	£1,374.25 inc VAT
Processor:	MOS 6509
RAM memory:	System 3K, 64K user area, 192K data and variables
ROM memory:	28K
Text screen:	80 × 25
Keyboard:	94-key full-travel detachable, 10 function keys, 19-key numeric keypad
Interfaces:	RS232C, IEEE 48, user port
Storage:	Commodore 8050 or 8025 disk up to 2Mb, single-sided, double density. Integral 340K drives soon.
OS/Language:	Basic
Other languages:	UCSD Pascal, Forth, Prolog
Manufacturer:	Commodore Business Machines Slough 79292
Distributor:	Adda 01-997 6666

Chris Bidmead adds up a package for the IBM PC which takes the spreadsheet into data analysis

As easy as 1-2-3?

In the beginning was VisiCalc. This was soon followed by CalcStar, PlannerCalc, Execuplan, Supercalc, T/Maker, Plan-80 and Perfect Calc. Now there is 1-2-3.

Generically known as the VisiClones, this family of packages transformed the eight-bit micro scene by displaying computing power on the screen in a way easily understood by non-programmers.

The VisiClone concept was hailed, not least by its vendors, as 'the breakthrough in personal computing'.

The vendor of 1-2-3, Lotus Development Corporation, is equally immodest about its package. 'A new generation of desktop computer programs . . . It combines the largest and most advanced



1

electronic worksheet yet developed with state-of-the-art graphics and a complete information management capacity.'

With some reservations, I agree with Lotus. 1-2-3 is the VisiClone to end all VisiClones.

Features

The program designers have done a marvellous job with 1-2-3 on three levels:

- Innovative ideas streamline the user's task of setting up data and formulae.
- The design has been extended to include graph production, database management and statistical analysis.
- The whole has been 'front-ended' by a shell called Lotus. A shell is a program that sits between the user and the operating system to provide a helpful, often menu-driven, outer wrapping. The Lotus shell goes a long way to integrating 1-2-3 with the system utilities of the IBM PC.

As a straightforward spreadsheet program, 1-2-3 has features reminiscent of two of the more interesting VisiClones (VCs): Supercalc and T/Maker. In an extension of ideas already present in Supercalc:

- 1-2-3 handles text intelligently, allowing labels to spill over into adjacent empty cells to the right. Many VCs insist that you enter long headings in a series of cell-sized chunks.
- IF . . . THEN statements and lock up tables are supported.
- Cells can be protected against accidental alteration, producing robust mathematical models that can be experimented with by inexperienced users.
- Any command entered at the keyboard may instead be entered into a text file, 'prerecorded' for later playback. The immense power of this keyboard macro facility — found to some extent also in T/Maker — usually dawns on you only after you get to know the package really well.

T/Maker is the odd man out among the VCs, choosing to store its formulae at the perimeter of the grid rather than in the cells. This makes the work file rather unkempt, and the package hard to get to grips with. The central design idea, however, is very elegant. It allows the spreadsheet concept to extend naturally into data sorting, sophisticated data searching, statistical analysis of field contents and consolidation across files.

1-2-3 appears to have picked up all these useful habits from T/Maker, extending them in several directions, and tidying them into the standard formulae-in-the-boxes approach.

Presentation

1-2-3 comes on four disks: tutorial, system, system backup copy, and a set of routines for printing graph files created by the main program. Documentation is a 'dwarf manual' tucked into a stiff slip cover, loose-leafed for updating, and glossily printed in ochre and black.

Tabbed section dividers help you find your way through the 350-odd pages. Three indices give you optional ways to track down the fine detail. Unfortunately, these are 'blind': you could wade through every page where the key word happens to appear.

This niggle apart, the documentation for 1-2-3 is exemplary. It has clear section headings, copious cross-referencing and an abundance of diagrams and examples. The tone is factual but friendly.

Getting started

The package comes preconfigured for IBM hardware. All you need to do is to use the batch routine supplied to get the PC-DOS system files and utilities onto the 1-2-3 system disk.

You cannot make your own copies as the system-reserved section of the disk is larger than that created by the PC-DOS format routine. Once loaded, 1-2-3 does a hardware call to check this. If you haven't got the original distribution disk in drive A, 1-2-3 reacts by bombing out. This is a potential nuisance. It's some consolation that a backup copy of the system disk comes with the package.

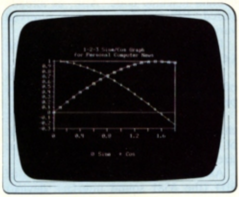
The Interactive Tutorial disk is clearly aimed at newcomers. A computer-naïve friend I tried it out on found it fascinating but baffling. He pointed out that the tutorial isn't really interactive at all — the user's path is entirely linear. Any departure from the tramlines, deliberate or accidental, is greeted by a bell tone from the console. The program refuses to proceed until the 'correct' key is pressed.

In Use

In practice, the real run-time package — with a proliferation of help pages callable from just about any point in the program — turned out to be a much better teacher.

You evoke 1-2-3 either from PC-DOS or from the Lotus shell. The arrow keys on the PC keyboard move the inverted video cursor around the spreadsheet, enabling you to set up data and formulae in a streamlined version of the standard VC procedure. Text can be entered directly, with no initial character defining its data type. Cell addresses can be fetched by shifting the cursor to the appropriate square; there is no need for a prefix keystroke (<ESC> in Supercalc) — the program logic automatically senses when an address is needed.

An elegant technique is used throughout to establish ranges of cells. It can be a chore to check the co-ordinates and enter them by hand. The 1-2-3 has a full-stop thumbtack to pin the cursor into position; as you pull at it with the arrow keys it covers the whole range. At the same time, the half-



2

completed formula you are assembling for entry receives the appropriate co-ordinates. A visual check shows you that the range of input numbers is covered. You enter the closing parenthesis, and the cursor automatically reverts to normal.

This sort of thoughtful invention characterises the ergonomics of 1-2-3. And more power behind the program unfolds when you enter a slash character to take you into the menu section.

The menus appear on the second and third lines of the screen, above the X-axis of the spreadsheet. The upper menu line represents an array of options, across which the cursor can be moved to make a selection. As the cursor moves, the lower

menu line shows the secondary options to each cursor-illuminated choice in the upper line. If no further options are implied by a particular upper line choice, a short sentence of explanation appears on the screen.

This mechanism serves as a sort of shorthand help sheet. The initial menu says: [WORKSHEET] RANGE COPY MOVE FILE PRINT GRAPH DATA QUIT. I'm using square brackets to represent the cursor. It's on Worksheet, so the second menu line reads: GLOBAL, INSERT, DELETE, COLUM-WIDTH, ERASE, TITLES, WINDOW, STATUS.

If you want FILE operations, say, you may either move the cursor across to cover the word FILE, or simply hit the F key. Moving the cursor allows you a sneak preview of the FILE menu. If you're happy, you hit carriage return to enter it.

With the cursor on [FILE] the lower line changes to: RETRIEVE, SAVE, COMBINE, XTRACT, ERASE, LIST, IMPORT, DISK.

As you become more familiar with 1-2-3, you start using the direct character approach. This drops you into the next menu immediately. Eventually the menus become unobtrusive and you enter character strings without a pause. /DQF, for example, takes you straight into the data search routine. Better still, the more common command strings are preloaded into the 10-key function keypad on the left of the keyboard. Lotus supplies a plastic template that fits over the function keys to explain at a glance what does what.

Full screen help sheets are available. If for some reason this isn't the screen you want, the arrow keys will jump the cursor to keywords in the text that lead to further explanations or other menus This is much more like interactive learning.

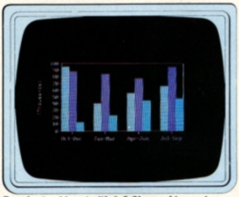
The new ground has really been broken in data handling and graphing.

In Figure 1 you'll find a small database of friends classified according to my feelings about them (the Type column) and the likelihood of their paying for the meal when we dine out (the Credit column).

Figure 2 is the Criterion range in which I lay out a model of the data I want to search for. The Criterion range may be anywhere on the spreadsheet; I've put it immediately to the right of the input data where it can be got at easily.

Figure 3 is the output that results from searching Figure 1 on the basis of Figure 2. In other words:

1. Select any record where the first letter of the first name is any character you like, the second letter is 'e' and the rest of the first name is immaterial. But don't bother unless their second name begins with 'G'.
2. Include all the Farthingales, whether or not they fit the above criteria.
3. On the same basis, include everyone whose credit rating is better than 70.



Bar chart achieved with 1-2-3's graphics system.

The system allows you to store the output in a separate part of the spreadsheet, or simply spot through the original database with the cursor hopping from one matching record to the next.

There are one or two awkward points about the data handling of 1-2-3.

The relational search on the Credit field requires a somewhat contrived cell reference rather than the more natural '> 70'. You have to be precise about upper and lower case — FARTHINGALE won't find Farthingale. Worst of all, 1-2-3 is meticulous about space characters. If the third line of the Criterion range were to include a space or two in the Second name field, the screen image would look exactly the same but 1-2-3 would select only those people whose credit was greater than 70 and who had no surname.

Probably the most spectacular feature of 1-2-3 is the ability to generate graphs from data in the spreadsheet. Picture 1 was obtained in a matter of moments by going through the following steps with the 1-2-3 data table:

- Use the DATA FILL facility to establish the range of data A2 to A20. 1-2-3 allows you to give names to ranges if you need to refer to them often.
- Leaving A1 blank as the input area for the variables, write in the formulae for Sine(A1) and Cos(A1) into B1 and C1. I've set the formatting for these cells to TEXT so that the formulae show.
- Evoke the DATA TABLE facility with /DT. You now respond to a short dialogue which asks you the table bounds (A1..C20) and location of the input cell.
- Without further intervention on your part, the routine tries out the input range of data value by value in the input cell. It inserts the results in the appropriate rows under each formulae.

Turning this data into a graph is almost as easy:

- Get into GRAPH mode by entering /G.
- The menu offers you five types of graph: line, bar, XY, stacked-bar or pie-chart. In our simple example we want an XY graph.
- Indicate the range of values to run across the X-axis (the range A2..A20). There's no need to set up the Y-axis explicitly — the routine will calculate its scaling.
- Similarly, feed in the two data ranges that are going to create the lines. Range B3..B20 will be the sine trace and C3..C20 will be the cos trace.
- Now press a single key, V for View. The screen clears and the data table is replaced by a graph (see photo 2 opposite).

There may be obscure corners of 1-2-3 that do not work, but I've been unable to find them. The code has the reassuring feel of being completely uncrashable. My only two niggles are the sensitivity of the Criterion pattern matching code to space characters, and the fact that the routine that sets up graphs on the screen is not very canny about spacing, and sometimes jumbles up closely juxtaposed figures.

Verdict

1-2-3 is the first 16-bit software I've seen that takes anything like full advantage of the power of the new generation of chips.

I hope 1-2-3 will begin to appear on machines other than the rather dull IBM PC. The version reviewed here also runs on Compaq, one of the IBM look-alikes.

Take the vendor's claims about 1-2-3's 'information management capability' with a pinch of salt. This isn't database management in the sense of dBASE II, Superfile or Condor. Everything takes place in memory. The database of which Figure 1 is the first few entries would take only 324 entries before the MEMORY FULL flag came up.

Figure 1

	A	B	C	D	E
1	FIRST NAME	SECOND NAME	TYPE	CREDIT	DATE
2	Kit	ffines	Superb	100	20-Mar-83
3	Ros	Earlle	Lovely	99	21-Mar-83
4	Patrick	O'Freeze	So-so	50	22-Mar-83
5	Kerry	Bate	Lovely	70	23-Mar-83
6	Arnold	Fink	Ugh	5	24-Mar-83
7	Melissa	Marsupial	Lovely	79	25-Mar-83
8	Fred	Farthingale	So-so	23	26-Mar-83
9	Wally	Waterbottle	Ugh	67	27-Mar-83

Figure 2

	F	G	H	I	J
1	FIRST NAME	SECOND NAME	TYPE	CREDIT	DATE
2	?e*	G*			
3		Farthingale			
4				+D2>70	

Figure 3

	K	L	M	N	O
1	FIRST NAME	SECOND NAME	TYPE	CREDIT	DATE
2	Kit	ffines	Superb	100	20-Mar-83
3	Ros	Earlle	Lovely	99	21-Mar-83
4	Melissa	Marsupial	Lovely	79	25-Mar-83
5	Fred	Farthingale	So-so	23	26-Mar-83

Sorting with 1-2-3 (see text for explanation)

Features — ■■■■
Documentation — ■■■■
Performance — ■■■■■
User Interface — ■■■■
Reliability — ■■■■■
Overall value — ■■■■

Name 1-2-3 **Application** Spreadsheet/graphics/database management **System** IBM PC, or Compaq, 128K **Price** £401 **Publisher** Lotus Development Corporation **Format** disk **Outlets** Personal Computers, 01-377 1200.

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...ur space
...asma Disruptors and
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...oothest hi-res graphics ever!
...-20 (any memory size)
...00% machine code with eight different alien types,
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for any ZX SPECTRUM.
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the trays, the rods, and all the rest.
But they didn't say I'd have to stop and control not just one but two
or even more garbage pods. Then prod them, push
them, toward that black hole, and oh, it's so very, very
black, and so lonely, so empty.
Panic, mustn't panic, but they won't stop, twirling and
spinning and turning, always turning, towards me, against
me, at me. And I'm alone.
No way out, nowhere to hide, on my own, my own... own
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WACKY WAITERS
..the name
of the game

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da wrestles with a machine code system for the ZX81 and finds it too clever by half

mplicity is a virtue

ly language processing sys-
e Sinclair ZX81 is a boon for
ling hemmed in by Sinclair
re a number of systems on
his one, from Amersham
es as several separate mod-
dependently but running
integrated whole.
ne three major components
- AM-ZXMON, a machine
and AM-ZXEDIT, a text
tering assembly code to
a two-pass symbolic

N is the heart of the system,
l on its own; the other two
l cannot operate without it.

Features

code monitor is the nucleus
tem, and is invisible to the
ised in this way. On its own

commands, so when you make a mistake in a line, you must re-type the complete line.

The AM-AZON assembler takes as input the source code from tape which you produce with AM-ZXEDIT. From this, it can produce either absolute binary or relocatable binary code.

But if you opt for absolute binary code, you will need to invest in yet another separate Amersham package — the AM-ZXLOC relocating loader.

With the assembler, you can load more than the source file, so you can load often-used symbol tales from tape, rather than rewriting them every time you code a fresh program. You can run absolute binary programs direct from the machine code monitor, and you are given a number of pseudo-operations to add to the standard Zilog Z80 operations, to make programming easier — HDNG, BLK, DC and so forth.

```
*4500  -  00
*H
4500   -  00 00 00 00 00 00 00 00
*:29 2A 32 34
*H
4504   -  00 00 00 00 00 00 00 00
*4500  -  29
*H
4500   -  29 2A 32 34 00 00 00 00
*4504  -  00
*:33 38 39 37
*:26 39 2E 34
*:33 00 2D 2A 26 29 2E ZZ
EH?
*4513  -  00
*:33
*450C  -  33
```

hand assemble' machine
nal. In other words, it lets
ify, save, merge and run
ge programs entered in

r commands let you save
or merge them together,
nt them out.
onitor lacking in several
vould normally expect to
at this price, such as a
search-replace com-

tor, AM-ZXEDIT, is
the monitor. It lets you
nguage source code in
vay as you would enter
e number first, then text
s long.
ded, saved or merged on
the assembler or for
amendment. But I was
this is a line-orientated
n a screen editor with

no intra-line editing

What is lacking in the assembler is a little simplicity. Source code has to be loaded into the assembler twice before assembly can take place, and a simpler approach would have been to incorporate the text editor into the assembler and sell them as a single package.

All three packages will support the Sinclair ZX printer.

Presentation

All three cassettes come in clearly printed outer sleeves, but with no loading instructions printed on them. Each comes with its own user manual, though there are quite a number of easily-spotted typographical errors.

On the whole, I thought the content was acceptable, though here and there the descriptions were a little vague.

In use

The machine code monitor proved to be easy enough to load, since you use the normal Sinclair format to do so. But the other two packages use a different format, and turned out to be very difficult to load.

No logo appears when the editor is loaded. Instead, a prompt — < — and a cursor are displayed. Commands are of the one-letter variety, such as S for SAVE, or M for MERGE. Generally, they require a parameter such as a line number or file name. I felt there were too few commands — amending a line of text usually meant retyping it.

The assembler is a different story. Here, there are plenty of commands — I kept having to refer to the manual. There are also plenty of useful prompts.

Once you have mastered these packages, it is possible to take a few 'short cuts' through the assembler. But it is quite fiddly to use, since you are forever having to change from one cassette to another.

Still, the assembler is very fast and the results are displayed on the screen and printer. Amersham's own-brand load and save format is faster than Sinclair's, which makes a real difference. The editor, however, slows down overall performance as does the constant loading and saving.

Reliability

The big disappointment with this system was its lack of error trapping. The software responded to invalid commands and data by either returning to Basic, or crashing the machine. This even happened with the assembler, which I would expect to be well protected.

Verdict

There must be an easier way to program in assembly language. The system is fine in its concept, but I cannot agree with the way the idea has been implemented.

There is too much fussing around with different cassettes and button-pushing on the tape recorder to load the three separate modules, when much of the system could be implemented on a single cassette.

The strong point of this system is the fact that it can cope with large amounts of object code, so might be better suited to the more 'serious' programmer. But many people will be very well satisfied with single-module, cheaper products such as Artic Computing's ZX Assembler.

RATING
Features — ■■■
Documentation — ■■
Performance — ■■■
User interface — ■■
Reliability — ■■
Overall value — ■■■

Name AM-ZXMON/AM-ZXEDIT/AM-AZON **Application** machine code monitor/text editor/assembler **System** ZX81 16K **Price** £6, £4, £8 **Publisher** Amersham Software 02403 6231 **Format** cassette **Other versions** AM-SPECMON for Sinclair Spectrum **Outlets** mail order.

Although the NewBrain is conceived as a total system, the unexpanded Processor itself has a great deal to offer. It is available in two forms: Model AD, shown below, with a built-in line display; and Model A, without the line display. Both models can operate with a monitor or a television set.

MEMORY

- 24K bytes of ROM;
- 32 bytes of RAM, at least 28K of which is available to the user.

THE SCREEN DISPLAY

- 40 or 80 characters to the line – without affecting the 28K bytes of RAM at your disposal;
- 24 or 30 lines to the screen;
- well-formed characters, with true descenders;
- a full European character set;
- normal or reverse video, high resolution graphics on screen of controllable size, 256, 320, 512 or 640 horizontal resolution by 250 vertical lines;
- a facility to set up a "page" of up to 255 lines, with the screen acting as a "window" to display it;
- ability to maintain several such pages simultaneously, and to switch rapidly between them;
- text may be used on graphics screen as well as on parts of the video screen not used by graphics.

CHARACTER SET

- 512 characters, including the full ASCII set, all European accented characters, Greek and graphics symbols.

GRAPHICS

- 20 powerful graphics commands;
- all text characters usable on the graphics screen;
- variable-sized graphics screen, with the rest of the screen available for text – for versatility and to save memory.

SOFTWARE

Enhanced ANSI BASIC; screen editor (32 commands); mathematics package (10 significant figures); graphics commands.

- a very friendly screen editor – a delight to use and readily adapted to text processing;
- arithmetic to 10 significant figures;
- very controllable output formatting of numbers – invaluable for accounting, statistics, and scientific applications;
- a powerful, much enhanced BASIC;
- a very flexible operating system, which allows any data stream to be opened to any device.

INTERFACES

- two tape cassette ports built into the processor unit;
- a built-in printer interface;
- a built-in communications interface (V24/RS232);
- a video monitor interface;
- a TV interface;
- an expansion interface for NewBrain system expansion modules.

KEYBOARD

- standard typewriter pitch, action, layout and size, with editing control and graphics keys.



*CP/M IS A REGISTERED TRADE MARK OF DIGITAL RESEARCH INC.

You can get everything in the box on the

If you understand the facts and figures on the left you'll soon realise that NewBrain has to be one of the most powerful micros around.

However, if you find the box on the left a little hard to follow, don't worry.

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Either way you'll discover that NewBrain is the kind of micro that will stop the competition getting a look in.

At £269 it starts off with twice as much memory as most of its competitors and can expand to over thirty times that amount. So there's no chance of being left behind in the micro race.

It comes with a very powerful language (enhanced ANSI BASIC) and it'll take CP/M,* so it'll work on the same system as similar big business micros, giving you the capacity to use an almost limitless variety of tried and tested software.

But most of all NewBrain is a machine that can expand.

It's designed to take disks, printers and memory expansion modules (up to 2M bytes) plus anything else you'd expect a professional business micro to handle.

So, whether you understand the box on the left or not, pay a visit to someone in the know on the right.

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NewBrain

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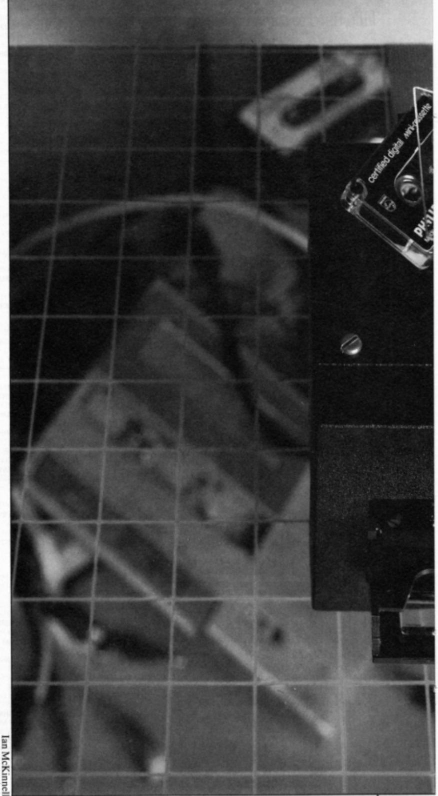
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left from anyone in the box on the right.

Middle Earth?

For your BBC, a halfway house between tape and cassette. David Janda reviews Ikon's Hobbit.



Ian McKinnell

The price of micros continues to plummet as manufacturers find newer and better ways to cram more and more circuits onto chips. Unfortunately, the same cannot be said about mechanical magnetic storage.

The micro commonly stores its data on a floppy disk.

The disk and drive were originally conceived as a way of transporting programs between large mini or mainframe computers. It wasn't long before it was realised that the drive was tailor-made for the micro, and disk operating systems like CP/M were developed to take advantage.

This was, and in many cases still is, a wholly adequate and cost-effective storage arrangement. But the buyer of a £100 micro is not really in the market for a storage device which probably costs at least twice as much as his computer.

The reason the floppy drive hasn't kept pace with the plummeting prices of micros is because it's a mechanical device.

It requires a very precise stepper motor to position the head over the correct track and the alignment of all the moving components is critical. Because of these constraints there is a limit to the number of engineering corners that may safely be cut.

Those of you waiting hopefully for the arrival of the microdisk, by the way, shouldn't expect that 'micro' will also refer to the price.

Present indications are that these floppy drives will cost about the same (perhaps eventually a little less) than the present range of 5¼in drives.

Meanwhile, the trusty domestic cassette tape recorder is beginning to show its limitations, especially as it has to service larger and larger memories.

Part of the procedure for loading a 16K program involves making at least one cup of coffee while the cassette slowly unburdens itself of the data.

The time factor could probably be tolerated if you had the assurance that the loading wouldn't crash (usually just a few seconds from the end of the program).

If you own a relatively cheap micro it seems reasonable to assume you are prepared to put up with a little chopping and changing of media and a little more waiting for data to load, in exchange for a storage device priced somewhere between a domestic cassette tape system and a full-blown disk drive.

The interest shown in Sinclair's mysterious microdrive is enough of an indication that the market is more than ready for an 'intermediate technology'.

Although the BBC is in a 'medium' price range, its comprehensive range of on-board interfaces makes its a prime target for a cheaper storage device.

The Hobbit from Ikon is one of a new breed of reasonably intelligent tape devices. It successfully bridges the domestic cassette/floppy disk price gap for the BBC owner. **Ian Scales**

The Hobbit is a tape recording unit as well as a cassette operating system for the BBC micro (models A and B). It provides the user with an alternative to expensive disk drives, but with some limitations.

The Hobbit comes in two parts — the cassette unit and an integrated circuit (IC) which contains the tape operating system to drive the Hobbit.

This ROM must be inserted into one of three sockets within the BBC machine before the cassette unit can be used.

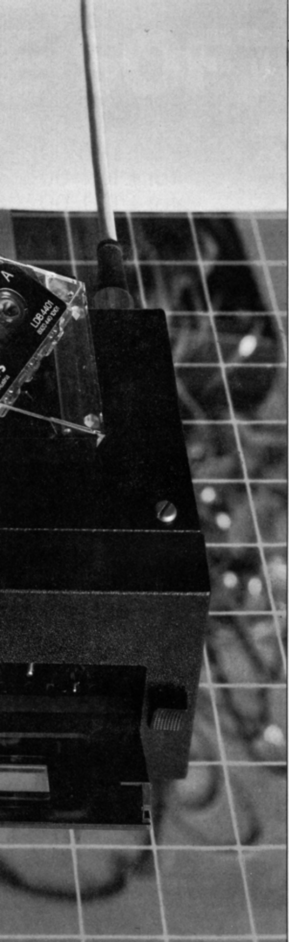
Once installed, the Hobbit will provide a faster, more efficient and flexible way to store data and programs than using a conventional cassette recorder.

It should be noted from the start that, although the Hobbit provides many powerful commands to enable the saving and loading of data or programs, it should not be purchased on the assumption that it will provide a complete alternative to disk drives.

What the Hobbit can provide is a super efficient, fast and flexible means of storing and retrieving data and programs. All the * tape commands are supported by the Hobbit plus a few more and it would be possible to use random access files.

Presentation

The Hobbit cassette unit comes in what is best described as a 'black box'. The unit is approximately 3½in wide × 3¾in high × 4in deep. Weighing approximately 2lbs,



the unit is small and compact.

It is a Philips digital cassette unit with an extra board in the back containing the necessary circuitry to enable it to talk to the Beeb.

The unit rests on four large rubber feet which grip most surfaces quite firmly — a good piece of design since you wouldn't want your £135 piece of kit sliding about the table.

The power cord is 3ft long and one end is inserted into the auxiliary power supply of the BBC machine. Unfortunately, the data cable (ribbon cable) is only 1ft 8in. This is inserted into the 20-pin user port on the underside of the BBC and this difference in length of cables will mean that the tape unit can be only some nine inches from the micro.

Ikon could have provided a longer ribbon cable as this small distance between the Hobbit and the computer can be quite annoying.

The Ikon uses Philips digital mini-cassettes which are the same size as the cassettes used in many dictating machines (55 × 32mm). Ikon can supply additional cassettes at £17.50 a box of six; standard dictaphone cassettes can be used but with lower recording quality.

The operating system for the Hobbit is housed in a 28-pin PROM (programmable ROM). It contains the necessary software to drive the Hobbit cassette unit as well as the commands to operate it.

Setting it up

It was a pity that the documentation that came with the Hobbit was not as comprehensive as the unit itself. With any piece of equipment that needs interfacing to a micro, documentation can mean the difference between setting the thing up correctly or messing up the whole show.

Nowhere near enough advice or tips are given in the documentation with regard to setting up the Hobbit. Unfortunately this extended to using the unit as well.

The case of the keyboard has to be removed and the keyboard unscrewed to install the PROM into one of the spare sockets — IC100, IC101 or IC88. This is a good design feature as it means that if a wordprocessor on ROM is in IC100 then the Hobbit PROM can be installed in one of the others.

Inserting the PROM proved to be very tricky and great care had to be taken to avoid bending any of the pins. Even under good light it was difficult to see whether the pins of the PROM were correctly aligned with the corresponding socket-holes.

I would suggest you use a flashlight when carrying out this part of the operation as installing the PROM the wrong way round or breaking one of the pins could have disastrous effects for you (financially) and the Beeb (electronically).

The PROM itself took about ten minutes to install.

The connecting cable which attaches to the Hobbit cassette unit and allows the Hobbit to communicate with the Beeb had to be connected to the user port of the Beeb.

WARNING: of all the operations in setting up the Hobbit this is the one that MUST be carried out precisely. If the connector is not properly installed — ie half the pins in and half out — then extreme violence can be inflicted on your micro.

The confusing part was the task of plugging in the power cord from the cassette unit to the auxiliary power supply socket on the BBC. The instruction manual instructed me to 'check that the polarising bump on the plug is nearest the computer.'

What's a polarising bump? After much deliberation and the third phone call to Ikon in Wales, I discovered that a polarising bump is a tiny triangle of plastic on the inside edge of the casing of the power cord. But of course!

Words to the effect of 'Put the plug in so the letters RS are facing the computer' would have been in order here.

Another problem with inserting a power cord into the Beeb's auxiliary power socket is that the socket is very wobbly and it is difficult to tell whether the plug concerned is inserted properly.

I understand that Acorn will be producing a different socket in the near future.

After the PROM has been installed and the necessary links moved the BBC can be reassembled.

Altogether installing Hobbit proved to be very tricky, partly because I don't have much experience in fiddling with hardware, partly because of bad design features of the BBC, and mostly because the documentation is not comprehensive enough.

If this description of installing the Hobbit is putting you off the idea of buying one — don't let it. Time and patience would have cured most of the problems I encountered. But if, like me, you don't like the idea of going through the fiasco of installing the system, Ikon Computer Products will do the installation for you for a fiver plus VAT.

In use

After installation the BBC can be turned on. The Ikon copyright is displayed together with the company's telephone number. This proved very handy.

Each active file requires a buffer and the Hobbit sets up two such buffers. A further three can be set up to enable up to five active (open) files at one time.

When using a cassette for the first time it has to be formatted. This process takes about two minutes and a name for the tape is required from the user.

Each side of every cassette needs a unique name so that the Hobbit will know what's happened and will respond accordingly.

Files can now be created just as you would if using an ordinary cassette recorder. The big difference is that the Hobbit is completely under software control. No need to use rewind, fast forward, record, play or align the tape to the next program/data file; the Hobbit does all that.

Saving program files proved to be simplicity itself. Once my test program was written all that was needed was to type 'SAVE "DEMO"' and hit the return key and the Hobbit went into action.

The tape moves about and when a free area on tape is found, the tape stops, the buffer is filled then flushed to tape until the SAVE is completed.

The Hobbit is much faster at loading and saving programs and data than conventional cassette recorders. 750 bytes of data are saved/loaded per second compared to

54▶

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51◄ an ordinary cassette's 150 byte capacity.

It should be noted, however, that load/save times may be longer than normally expected. If you want to load a program called BLOGS the Hobbit first checks whether BLOGS is in the catalogue. If BLOGS exists the Hobbit then moves the cassette and *then* LOADs.

An example of this was my first program which took 12 seconds to SAVE but 23 seconds at a later time to LOAD.

The recording quality proved to be excellent. Two small test programs were written to test the quality and speed of the Hobbit as a medium for storing data. The first program saved 10,000 numbers onto tape and the second read the data files and verified the numbers.

Each program was run ten times, the first took four minutes 33 seconds (average) to run each time, and the second took four minutes 22 seconds. The result? Not one number was recorded incorrectly.

After completing this test, I entered '*DELETE "DATA: D' to delete the test data; to my surprise it took three minutes 52 seconds. The reason for this is that the Hobbit 'chains' along every block of the file to be deleted and marks it without actually erasing it. Any subsequent SAVEs will overwrite the file.

In case a file is accidentally deleted it can be saved by using the Hobbit's *RECOUP command.

The Hobbit has 19 error messages. Unfortunately the messages themselves are not very detailed and the manual does not contain a list of error messages.

There are also two hardware snags. First, the Hobbit needs a clock to keep track of things and so makes use of the BBC's internal timer.

I discovered this only when I was running some benchtests and the timer informed me that the test had taken 40 seconds when it had really taken four minutes.

Second, it is normally possible to type CTRL B and all output to the screen will appear on the printer. Not with the Hobbit. I found that the system would just hang-up when a listing of the program present in memory was asked for.

The only way I could get proper printout was to use *FX commands just before and immediately after printout was required.

Verdict

You will no doubt have noticed that I have not compared disk drives with the Hobbit. This is because, while on one hand they are very similar — random access, append, copy etc — on the other they are radically different.

The Hobbit takes the drudgery out of using cassettes, and with its excellent performance, outstrips any cassette recorder I have seen.

Machine Hobbit, tape system for BBC micro
Price £135 (+ VAT) **Interface** BBC user port
Contact Ikon Computer Products, 099421 515.

Hobbit at your command

Summary of file handing statements

*CAT	Standard:	To obtain a catalogue of the cassette. The Hobbit will display the name of the volume, the drive number and the name of each file together with the file type (D or P) and the number of blocks assigned to it.
*DELETE	Extra:	To delete a file.
*KILL	Extra:	To delete all files on one side of a Hobbit cassette.
*FORMAT	Extra:	Used when a cassette is being used for the first time, timing information and a volume name is recorded onto the cassette.
*RECOUP	Extra:	To be used when a file has accidentally been deleted. Can be used only if no file was created AFTER the deletion.
*RENAME	Extra:	Used to change a file name.
*COPY	Extra:	To copy one file to another.
*TAPE	Extra:	To return to the standard BBC domestic cassette filing system. Enables the user to transfer files between an audio cassette and the Hobbit.
*BBC	Extra:	To return the system to the standard BBC operating system as if the Hobbit had never been installed. Also puts PAGE to normal 1C00 Hex.
*LOAD	Standard:	To load machine code program from Hobbit into memory.
*SAVE	Standard:	Copy an area of memory into a Hobbit file.
*RUN	Standard:	Loads a machine code program from Hobbit and runs it.
*SPOOL	Extra:	To copy all screen output to a Hobbit file.
*EXEC	Standard:	Takes input from a file as if it came from the keyboard.

Standard denotes that the command is supported under normal domestic cassette systems. Where extra is stated, it means these commands are not available to the domestic cassette user — although some of the extra commands are supported under the BBC's disk operating system.

All the BBC Basic file operators are supported on the Hobbit. The exception to this is OPENIN and OPENOUT which have four extra control codes:

W	causes a write only file to be opened.
R	causes a read only file to be opened.
B	causes a file to be opened for reading and writing.
X	causes a file to be deleted.

EXAMPLE Z=OPENOUT("DEMO: R")
opens a read only file called DEMO.

Commands can have arguments:

@	Inhibit check	Stops Hobbit from checking whether a file exists.
D	Drive	Two Hobbits can be used and D (integer) specifies which.
T	Type	Hobbit recognises two types of file program (P) or data (D).
A	Append	Hobbit can be instructed to append data or program onto an existing file.
NN	Size	Specifies number of blocks a file is to have assigned to it when created. Default value given if not specified.

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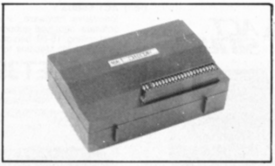
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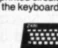
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Acorn Atom User Group. Subs: £4. No meetings but quarterly newsletter. Contact Peter Frost, 18 Frankwell Drive, Coventry, 0203 613156.
Manchester Acorn User Group. Meets at AMC, Crescent Road, Crupsall, Manchester 8 on Tuesdays except school holidays, fees: £1. Contact John Ashurst, 192 Vendure Close, Failsworth, Manchester, 061-681 4962.
National Acorn Atom User Group. Program magazine. Contact Alan Carr, 105 Fairhole Avenue, Gidea Park, Romford, Essex.
Medway Acorn User Group. Meets at St John Fisher School on last Monday of month at 7pm. Session at 9pm Thursdays at the Fox & Hound, Chatham. Contact Clem Rutler, c/o St John's Fisher School, Ordance Street, Chatham, Kent, 0634 42811 (day), 0634 373459 (eve).

Apple

Bristol Apple Users & Dabblers. Meets at 10 Waring House, Redcliffe Hill, Bristol BS1 6TB, once a month. Newsletter. Contact Ewa Dabkowski, c/o Datalink, 10 Waring House, Redcliffe Hill, Bristol BS1 6TB, 0272 213427.
Croydon Apple User Group. Meets at Sidda House, 350 Lower Addiscombe Road, Croydon, on second Monday of month. Subs: £5, £10 commercial members. Contact Paul Vernon, 60 Flawkhurst Way, West Wickham, Kent, 01-777 5478.
British Apple Systems User Group. Meets at Old School, Branch Road, Park Street, St Albans, Hertfordshire, on first Tuesday and third Sunday each month. Annual subs: £12.50, joining fee: £2.50. Publishes magazine. Contact John Sharp, 09273 75093.
Apple Users Group. Contact Steve Profitt, The Granary, Hill Farm Road, Marlow Bottom, Buckinghamshire, 062-84 73074.

Atari

Silica Atari 400/800 User Club. New club, library planned, newsletter. Contact Richard Hawes, 01-301 1111.
Preston Atari Computer Enthusiasts. Meets at KSC Club, Merrion House, Beach Grove, Ashton, Preston, on third Thursday of month at 7.30pm. Subs: £5. Contact Roger Taylop, 0253 738192.

Atom

Liverpool BBC and Atom User Group. Meets at Old Swan Technical College, Room C33 on first Wednesday of month at 7.30pm and at Birkenhead Technical College on third Thursday of month at 7.30pm. Contact Nick Kelly, 051-525 2934 (evenings).

BBC

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Comal User Group. Meets at Polytechnic of North London, Holloway, on second Wednesday of month, term time. Subs: £7.50. Contact John Collins, 75 74111.

Commodore ICPUG

Blackpool. Meets at Arnold School, Blackpool, on third Thursday of month. Contact David Jarrett, 197 Victoria Road, Thornton Cleveleys, Blackpool FY5 3ST.
Carrickfergus. Contact David Bolton, 19 Carrickburn Road, Carrickfergus, Antrim BT38 7ND, 09603 63788.
Cheltenham. Meets at The Cheltenham Ladies College on last Thursday of month at 7.30. Contact Alison Schofield, 78 Hesters Way Road, Cheltenham, Gloucester, 0242 580789.
Clwyd. Contact John Poole, 6 Ridgeway Close, Connah's Quay, Clwyd CH5 4LZ.
Corby. Contact Peter Ashby, 215 Wincohn Way, Corby, Northamptonshire, 05363 4442.
Derby. Meets at Derby Professional Colour every other Tuesday at 7pm. Contact Robert Watts, 0332 72569.
Barnsley. Subs: £7.50. Contact Bob Wood, 13 Word Green, Barnsley, South Yorkshire, 0226 85084.
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North-East Pet and ICPUG. Meets at Lawson School, Burnley at 7pm second and third Mondays of month. Contact Jim Cocallis, 20 Worcester Road, Newton Hall Estate, Durham.
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Liverpool. Meets at The Merchant Taylor School for Boys, Crosby, on second Thursday of month at 7pm. Software exchange. Contact Tony Bond, 27 Ince Road, Liverpool L23 4UE, 051-924 1505.
London. Contact Alan Birks, 135 Queen Alexandra Mansions, Judd Street, London WC1, 01-430 8025.
North London. Contact Barry Miles, Department of Business Studies, North London Polytechnic, Holloway Road, London N7, 01-607 2789.
Norfolk. Contact Peter Petts, Bramley Hale, Wretton, King's Lynn, Norfolk PE33 9QS, 0366 500692.
Northumberland. Proposed new club. Contact Graham Saunders, 22 Front Street, Guide Post, Northumberland.
Slough. Meets at Slough College on second Thursday of month at 7.30pm, visitors — 65p adults, 40p students. Contact Brian Jones, 53 Beechwood Avenue, Woodley, Reading RG5 3DF, 0734 661494.
South-East Regional Group. Meets at Charles Darwin School, Jail Lane, Biggin Hill, Kent, on third and fourth Thursday of month at 7.30pm. Subs: £7.50. Free library, discount service, courses and newsletter. Contact M Ryan, 164 Chesterfield Drive, Riverhead, Sevenoaks, Kent TN13 2EH, 0732 453530.
Staffordshire. Annual subs: £6.50. Group newsletter. Contact at 57 Clough Hall Road, Kidsgrove, Stoke-on-Trent.
South Midlands. Meets at 12 York Street, Stourport-on-Severn on last Thursday of month. Help available with business programming problems. Contact M J Merriman at above address.
Teddington. Contact G Squibb, 108 Teddington Park Road, Teddington, Middlesex, 01-977 2346.
Watford. Meets on second Monday of month. Contact Stephen Rabagtiati, c/o Institute of Grocery Dist., Grange Lane, Letchmore Heath, Watford, Herts, 01-779 7141.

Commodore Pet

Southern Users of Pets Association. Contact Howard Pilgrim, 42 Compton Road, Brighton BN1 5AN.
Pet User Group Crawley. Contact Richard Dyer, 33 Parham Road, Ilfield, Crawley.
Pet Users Education Group. Produces newsletter. Contact Dr Chris Smith, Department of Physiology, Queen Elizabeth College, Camden Hill Road, London W8 7AH.
UK Pet Users Club. Annual subs: £10, newsletter. Contact 360 Euston Road, London NW1 3BL.
Pet Users Group. Meets at Polytechnic of North London, Eden Grove, Room 320. On alternate Tuesdays, 6pm. Contact Barry Miles 01-607 2789.
Pet User Club. Contact Margaret Gulliford, 818 Leigh Road, Slough Industrial Estate, 0753 74111.
Independent Pet Users Group. Contact 57 Clough Hall Road, Kielsgrove, Stoke-on-Trent, Staffordshire.
West Lancashire Pet Users Club. Meets at Arnold School, Blackpool on the third Thursday of month. Contact D Jowett, 197 Victoria Road, East Thornton, Blackpool FY5 3ST.

Commodore Vic

Vic Burnley. Proposed club. Contact John Ingham, 72 Ardwick Street, Burnely, Lancashire.
Vic Users Group. Meets on alternate Tuesdays at 6.30pm at Polytechnic of North London, Community Centre. Contact Robin Bradbeer.
Vic-20 Cromer. Proposed club. Contact J Blair, 7 Beach Road, Cromer, Norfolk, 0263 512849.

Compucolour

Compucolour Users Group UK. Meets at Community Centre, Caversham Park Village twice a year. Subs £15. Contacts with USA, Australia and Canada. Newsletter, program library. Contact Peter Hiner, 11 Pennycroft, Harpenden, Herts, 05827 64872

CP/M

CP/M Users Group UK. Subs £7. Software library, newsletter, help service. Contact Lesley Spicer, 11 Sun Street, London EC2M 2QD, 01-247 0691.
Irish CP/M Users Group. Subs £5, meets monthly in Dublin area. Newsletter. Contact Doug Notley, Gardner House, Ballsbridge, Dublin 4, Dublin 686411.

COSMAC

COSMAC Users Club. Contact James Cunningham, 7 Harrowden Court, Harrowden Road, Luton, Bedfordshire 0582 423934.

Digital Equipment

Digital Equipment Computer Users Society. Program library. Contact the secretary, PO Box 53, Reading, Berks, 0734 387725.

Education

Education ZX80/81 User Group. Subs: £2.50. Contact Eric Deeson, Highgate School, Balsall Heath Road, Highgate, Birmingham B12 9DS.
MUSE. Subs £10, students £6.50. National body for co-ordinating activity in schools, colleges. Contact Lorraine Boyce, MUSE Information Office, Westhill College, Weoley Park Road, Birmingham, 021-471 3723.
Computer Education Society of Ireland. Subs: £3. Contact Dairmuid McCarthy, 7 St Kevins Park, Kilmacud, Blackrock, Co. Dublin.
Educational Users Group. Offshoot of national TRS-80 Users Group. Contact Dave Fletcher, Head Teacher, Beaconsfield First and Middle School, Beaconsfield Road, Southall, Middlesex.
Mini and Microcomputer Users in Education. National organisation. Contact R Trigger, 48 Chadcote Way, Catshill, Bromsgrove, Worcestershire B61 0JT.

Forth

Forth Interest Group UK. Meets at Room 408 South Bank Polytechnic on the first Thursday of month. Subs: £7. Newsletter. Contact K Goldie-Morrison, 15 St Albans Mansion, Kensington Court Place, London W8 5QH, 01-937 3231.

FX-500-P

FX-500-P Users Association. Contact Max Francis, 38 Grymsdyke, Great Missenden, Bucks HP16 0LP.

Genealogists

Society of Genealogists Computer Interest Group. Subs: £3. Newsletter. Contact Anthony Camp, 01-373 7054.

Intel MDS

UK Intel MDS Users Group. Newsletter. Contact Lewis Hard, c/o S.P.A.C.E., The Old Coach House, Court Row, Upton-on-Severn, Worcester WR8 0NS.

Ithaca Audio S100

Ithaca Audio S100 Users Group. Software exchange, discount. Contact Dave Weaver, 41 Dore Avenue, North Hykenham, Lincoln LN6 8LN.

ICI

ICI Micro Users Group. Meets fortnightly. Contact Keith Heron, 32 Norfolk Road, Congleton, Cheshire.

Jupiter Ace

Jupiter Ace Users Club. Subs: £7. Newsletter, add-ons. Contact, John Noyce, Remsoft, 18 George Street, Brighton BN2 1RH.

Mattel

Mattel Intellivision TV Game Group. Proposed group to organise games, competitions. Contact Warrington 62215 after 4pm.

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Primary Health Care Group. Contact Dr Alastair Malcolm, British Computer Society, Cheveley Park Medical Centre, Belmont, Durham, 0385 64282.
Medical Micro Users Group. Newsletter. Contact Medicom, 1-2 Hanover Street, London W1.
TRS-80 Medical and Laboratory Users. Newsletter. Contact Dr Robinson, The Residency, Northwick Park Hospital, Harrow, Middlesex.

Apple

Apple Music Synthesis Group. Contact Dr David Ellis, 22 Lennox Gardens, London SW1.
Milton Keynes Microcomputer User Group. Meets every Tuesday, 7.30pm. Contact Brian Pain, Sir Frank Markham School, Woughton Centre, Chaffron Way, Milton Keynes.

Nascom

Birmingham Nascom User Group. Meets at Davenports Social Club, Granville Street, Birmingham on the last Thursday of month, 8pm. Contact Martin Sidebotham, 021-744 3093.
International Nascom Microcomputer Club. Subs: £5. Newsletter, program library. Contact 80 Oakfield Corner, Sycamore Road, Amersham, Buckinghamshire HP6 5EQ.
Merseyside Nascom User Group. Meets at Mona Hotel, St James Street, Liverpool, on the first Wednesday of month, 7.30pm. Contact Mr T Searle, 051-526 5256.
Nascom Thames Valley User Group. Meets at Frogmore Hotel, Windsor, on Thursday fortnightly, 8pm. Newsletter. Contact Mike Rothery, 37 Eaton Wick Road, Eton Wick, Windsor, Berks, Windsor 56106.

Newbrain

National Newbrain User Group. Subs: £5. Contact J Hudson, 6 Swanborough Place, Whitehawk, Brighton.

Ohio

Ohio Scientific User Group. Subs: £5. Newsletter. Contact Tom Graves, 19a West End, Street, Somerset 0458 45359.

Osborne

Osborne User Group. Subs: £10. Newsletter. Contact J Anglesea, Flat 19, Rowan House, Handsworth, Birmingham B20 2JR.

OSI

OSI UK User Group. Contact Richard Elen, 12 Bennerley Road, London SW11 6DS.

Pascal

Pascal User Group. Subs: £9. Contact Nick Hughes, PO Box 52, Pinner, Middlesex HA5 3FE.

PDP

PDP8 User Group. Newsletter. Contact Nigel Dunn, 21 Campion Road, Widmer End, High Wycombe, Buckinghamshire, 0494 714483.
PDP11 User Group. Information service only. Contact Pete Harris, 119 Carpenter Way, Potters Bar, Hertfordshire EN6 5QB. 0707 52091.

Pilot

UK Pilot User Group. Contact Alec Wood, Wirral Grammar School for Boys, Cross Lane, Bebington, Wirral, Merseyside LG3 3AQ.

Prestel

ACC National Prestel Committee. Administrates Club Spot 800 (hobbyists on Prestel). Contact secretary, Rupert Steele, St John's College, Oxford OX1 3JP.

Research Machines

Research Machines 380Z. Contact Peter Smith, Birmingham Educational Computing Centre, Camp Hill Teachers Centre, Stratford Road, Birmingham B11 1AR.
Research Machines Ltd National User Group. Contact M D Fisher, PO Box 75, Oxford OX4 1EY.
NE RML 380Z User Group. Meets monthly at Micro-Electronics Education Centre of the Polytechnic Coach Lane Campus. Subs: £5. Contact Mr Hatfield or Mr Reed, Computer Unit, Northumberland Building, Newcastle Polytechnic. 0632 326002.
Research Machines National User Group. Contact RML, Mill Street, Osney, Oxford OX2 0BW. 0865 249866.
West Midland RML User Group. Contact Spencer Instone c/o, 59 Avenue Road, Leamington Spa.

Sharp MZ80

International Sharp Users Group. Subs: £3. Newsletter. Contact Graham Knight, c/o Knights Computers, 108 Rosemount Place, Aberdeen, 0224 630526.
Sharp MZ80K User Group. Contact Joe Street, 16 Elmhurst Drive, Hornchurch, Essex RM11 1PE.
Postal MZ80K User Group. Contact Noel Williams, 07425 88058.
Sharp MZ80 Users Club. Contact Tim Powell, Computer Centre, Yeovil College, Yeovil, Somerset BA21 4AE.
Sharp PC1211 Users' Club. Subs: £5. Newsletter. Contact Jonathan Dakeyne, 281 Lidgett Lane, Leeds LS17 3AQ.

Sinclair

Sinclair ZX Computer Club. General monthly meeting, newsletter. Equipment for hire, specialist meetings, library. Contact secretary, Ken Knight, 0296 5181.
Colchester Sinclair User Group. Meets fortnightly. Contact Richard Lawn, 102 Pretty Gate Road, Colchester, Essex.
Cardiff ZX Club. Meets on last Sunday of month, 2pm. Subs: £5. Telephone service, software library. Contact Mike Hayes, 54 Oakley Place, Grangetown, Cardiff. 0222 371732.
Brighton ZX Users Group. Contact J Ireland-Hill Jnr, 145 Godwin Road, Hove, Brighton.
Glasgow ZX80/81 User Group. Contact Ian Watt, 107 Greenwood Road, Clarkston, Glasgow, 041-638 1241.
Hassocks ZX Micro User Club. Contact Paul King, 25 Fir Tree Way, Hassocks, West Sussex.
ZX Computer Club. Meets at ZX Computer Centre, 17 Sweeting Street, Liverpool, on Wednesday, 6.30pm. Contact Keith Archer, 051-260 4950.
National ZX User Club. Monthly magazine 'Interface'. Contact Tim Hartnell, Interface, 44-48 Earls Court, London W8.
Sinclair User Group. Meets at Polytechnic of North London, Room 2-5 Tower Block. Mondays, 6.30pm. Contact Irving Brand, Polytechnic of North London, Holloway Road, London.
Edinburgh ZX. Meets at Claremont Hotel, Claremont Crescent, Edinburgh on second and fourth Wednesdays every month, 7.30pm. Subs: £5 adults, £3 juniors, students, OAPs and unemployed. Newsletter. Contact John Palmer, 56 Meadowfield Drive, Edinburgh. 031-661 3183.
ZX80/81 National Software Association. Subs: £6. Newsletter, software available on cassette. Contact 15 Woodlands Road, Wombourne, Staffordshire WV5 0JZ.
ZX Amateur User Group. Newsletter. Contact Paul Newsman, 3 Red House Lane, Leiston, Suffolk.
Guildford ZX81/80 Users Group. Meets Fridays, club magazine. Contact A Bond, 54 Farnham Road, Guildford, Surrey GU2 5PE, 0483 62035.
ZX80/81 Users Club. Newsletter. Contact David Blagden, PO Box 159, Kingston-upon-Thames, Surrey KT2 5UQ.
Swale ZX User Group. Contact John Schmitt. 87 2887.
Sinclair Club. Contact J Edwards, 296 Blossomfield Road, Solihull, West Midlands, 021-705 1647.

Sirius

Sirius User Group. Newsletter, program library. Contact Ray D'Arcy, Sirius User Club, The Microsystems Centre, Enterprise House, 7-71 Gordon Street, Luton. 0582 412215.

68XX

68XX Special Interest Group. Contact Tim Turner, 63 Millais Road, London E11 4HB, 01-558 3681.

Software

Software Group. Meets at Polytechnic of North London, Room 2-3 Tower block Thursdays, 6pm. Contact Mike Duck at Polytechnic of North London, Holloway, London N7.
Program of the Month Club. Discount programs, newsletter. Contact Mr Durrant, 55 St Thomas Street, Oxford OX1 1JG, 0855 250333.

Sorcerer

European Sorcerer Club. Monthly meetings. Subs: £7.50, newsletter. Contact Colin Marle, 32 Watchyard Avenue, Formby, near Liverpool L37 3JU, 070 48 72137.
Exidy Sorcerer User Group. Newsletter, program exchange. Contact Andy Marshall, 44 Arthurs Bridge Road, Woking, Surrey GU21 4NT.

Spreadsheet

International Electronic Spreadsheet Users Group. Newsletter. Contact UK Alpha House, 7th Floor, Rowlandsway, Manchester M22 5RG.

Tangerine

Tangerine Homebrew. Contact A Coates, 35 Mogg Street, St Werburghs, Bristol BS2 9UB.
Tangerine Users Group. Hardware and software suppliers. Contact Bob Green, 16 Iddesleigh Road, Charminster, Bournemouth.

Texas Instruments

National TI 58/59 User Group. Subs: £5.50. Program exchange, newsletter. Contact R Murphy, Department of Electronic Engineering, University College, Singleton Park, Swansea, S Wales.
TI 9900 User Group. Software, data libraries. Contact Chris Cadogan, Department of Computer Science, University of Manchester M13 9PL.
TI99/4A User Group. Meets at 30 Gipton Wood Road, Leeds 8, Mondays 7pm. Subs: £6. Contact I Youlden. 0532 401408.

Triton

Triton User Group. Subs: £4. Newsletter, software exchange. Contact Nigel Stride, Transam Ltd, 12 Chapel Street, London NW1, 01-402 8137.

TRS-80

National TRS-80 User Group. Meets at Adam & Eve Pub, 1st Floor, Bradford Street, Birmingham on last Friday of month. Subs: £2.50. Newsletter, software library. Contact Michael Gibbons, 1 New Street, Castle Bromwich, Birmingham B38 9AP, 021-747 2260.
TRS-80 User Club Chelmsford. Contact Michael Dean, 22 Roughtons, Galleywood, Chelmsford, Essex.
North East TRS-80 User Group. Meets at Information Technology Centre, Gateshead on the third Wednesday of month, 7pm. Subs £5. Newsletter. Contact J Dunn, 8 Ettrich Terrace, North Gateshead, County Durham.
Scottish TRS-80 & Genie User Group. Meets at Mansion House Hotel, Milton Road second Thursdays of month, 7.30pm. Contact Dick Mackie, 3 Warrender Park Crescent, Edinburgh EH9 1DX, 031-229 6032.
Isle of Wight TRS-80 User Club. Meets at London Hotel, Ryde on last Friday of month, 7.30pm. Contact Sean Coulson, 0903 614589.
TRS-80 User Group. Contact Alan Reid, 22 Woodeys Road, Rainham, Kent. 0634 367012.
UK DOSPLUS User Group. Contact Peter Tootill, 101 Swanside Road, Liverpool L14 7NL.
Merseyside TRS-80/Video Genie User Group. Meets second Thursday of month, 7.15pm. Contact Peter Tootill, 101 Swanside Road, Liverpool L14 7NL. 051-220 9733.
TRS-80 Genie Group. Meets at Central Common Room, The Residency, Northwick Park Hospital on first Sunday of month. Contact Dr Nick Robinson, Central Room, The Residency, Northwick Park Hospital.
TRS-80 Users Group. Meets at Welwyn Park Community Centre on alternate Thursdays at 7pm. Subs: £12. Saturday workshop. Contact Neil Griffiths, 0858 65718.
East Midlands TRS-80 Users Group. Newsletter. Contact Mike Costello, 17 Langbank Avenue, Rise Park, Nottingham NG5 5BU. 0602 751753.
TRS-80 Level 1 User Group. Subs: £5. Software library, newsletter. Contact N Rushton, 123 Roughwood Drive, Northwood, Kirby, Merseyside.
National TRS-80 & Genie User Group. Fees £7 for six months, newsletter. Contact Brian Pain, 24 Oxford Street, Stony Stratford, Milton Keynes.
Northwest TRS-80 User Group. Meets at Barton Aero Club, Barton Aerodrome, Irlam, near Manchester on last Wednesday of month, 8pm. Subs: £8. Sub-group meets at Crown Hotel, Blackfriars Street, on first and third Monday of month. Newsletter, software library. Contact Melvin Franklin, 40 Cowlees, Westhoughton, Bolton, Lancashire.

UCSD

UCSD System Users Society. Contact John Ash, Dicoll Data Systems Ltd, Bond Close, Kingsland Estate, Basingstoke, Hants RG24 0QB.
UCSD Pascal UK Users Group. Contact Malcolm Harper, Oxford University Computing Laboratory Programming Research Group, 45 Banbury Road, Oxford OX2 6PE.

CUA

CUA User Group. Contact Adrian Waters, 9 Moss Lane, Romford, Essex.

6502

6502 User Club (Southern Region). Contact Steve Cole, 70 Sydney Road, Gosport, Hants.
6502 User Club. Contact Walter Wallenborn, 21 Argyll Avenue, Luton, Bedfordshire LU3 1EG. 0582 26967.

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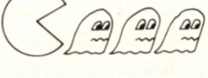
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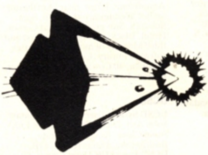
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PCN ProgramCards

PCN ProgramCards have been well-received in the short time since the magazine was launched, and some readers have come up with suggestions on improving their clarity and ease of understanding. So, where appropriate, we will be making some annotations more specific, identifying the special characters used by different machines.

The number of pages allocated to ProgramCards will be increased to enable us to cover a wider range of machines, languages and applications. This gives you a better chance of sharing your own favourite program or subroutine with PCN's rapidly growing audience.

This week

It seems that Coventry, not only at the heart of the country, is fast becoming a centre of programming expertise. After Mrs Thatcher's program in the April 1 issue (no April fool, honest) and the final four cards of Barry Walsh's Commodore 64 fruit machine program this week, we present another contributor from that city.

M M Tew has written an entertaining game for the Oric-1 (48K version). This program is loosely based on the TV programme *Wacky Races* and it will be serialised over this issue (with the first three cards) and during the following two weeks.

Because of the different placement of display memory between the 16K version and the 48K version of the Oric-1, readers who would like to run this on the smaller machine will have to modify the appropriate PEEK and POKE commands. Included in this program are six pre-defined circuits, but others may be added at the user's discretion.

The sub-routine section this week presents routines to facilitate input and verification of data from the keyboard. This means that clarity, consistency and safety can be easily incorporated in any program requiring keyboard input. The example program shows their use in a simple fashion.

See your name in print!

Become a legend in your own lunchtime. Send your example of programming expertise on disk or cassette with a plain paper printout to the address below.

We'd also like a brief description of what the program does, and notes including memory requirements, special hardware needed etc.

All programs are checked by a referee before publication so that only fully debugged programs are published.

As if the promise of fame was not enough we'll even pay you for them, at our standard rates.

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If you are interested in becoming a referee for submitted programs then send details of experience, machines covered etc to: Programs Editor, Personal Computer News, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

PCN ProgramCards

Wacky Racers Card 1 of 9

8305WR1/9

This entertaining program includes six circuits and takes up 11K of memory. To reduce memory requirements remove five of the circuits — this occupies 5K. Requires modification to run on 16K machines.

```
1 MS=6:REM*NUMBER OF SCREENS*
5 TEXT:PRINTCHR$(6)CHR$(29)CHR$(17)CHR$(12)
7 INK7:PAPER0
10 GOSUB2000
11 GOSUB6000
12 INPUTSS$
13 IFSS$="R"THENGOSUB5000:CLS:GOTO11
15 IFVAL(SS$)>MSORVAL(SS$)<0THEN12
20 SC=0:ST=1:DE=20:LI=5:W=0
21 IFSS$="1"THENST=1
22 IFSS$="2"THENST=2
23 IFSS$="3"THENST=3
24 IFSS$="4"THENST=4
25 IFSS$="5"THENST=5
26 IFSS$="6"THENST=6
30 GOSUB3000
40 X=48000+X1+Y1*40
50 D=7
60 POKEX,C(D)
65 WAITDE
70 V$=KEY$
80 D=D-(CHR$(9)=V$)+(CHR$(8)=V$):IFD>8THEND=1
90 IFD<1THEND=8
100 IFV$=CHR$(11)THENDE=DE+(DE>0)
110 IFV$=CHR$(10)THENDE=DE-(DE>0)
200 N=X+D(D)
210 IFPEEK(N)=32THENPOKEX,32:X=N:GOTO60
220 IFPEEK(N)=42THENPOKEX,96:EXPLODE:WAIT300:POKEX,32:GOTO300
230 IFPEEK(N)=105THENSHOOT:GOTO500
300 LI=LI-1:IFLI<1THEN350
302 A$=KEY$+KEY$+KEY$
305 SC=SC-3
310 GOSUB4000
320 GOTO40
```

Oric-1
Oric Basic

Requirements: 48K
Application: Game
Author: M M Tew

Refer to manual for PEEK and POKE use.

5	Turn off key-click, cursor, clear screen.
7	White on black.
10	Perform initialisation routine.
11	Perform display instruction routine.
12	Input response to instructions.
13	If "R" typed then perform review of circuits and restart.
15	Any other input not in range 0 — *MS* requires re-entry.
20	Sets base running values for current game.
21-26	Selects circuit number if entry non-zero.
30	Performs circuit drawing routine.
40	Main game section start. Set POKE address.
50	Index for array *C*.
60	*C(D)* value into address *X*.
65	*DE* is varied according to cursor up/down speed control.
70	Single key input.
80	Adjust index (*D*) by direction (cursor left/right).
90	Underflow trap.
100-110	Speed adjustment.
200-230	Checks for on/off road and collection of "i".
300	Off road — lose life. When all lost game over.
302-310	Deals with score line on life lost.
320	Continue game sequence.

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QUICK-CHANGE: Price list editor: prices of single entries or whole lists changed by user chosen factors. Minimum system required: 16K level II; please state memory size for diskette system. Instructions included: cassette **£9.95**, sssd/dd mini-disk **£12.95** inclusive of packing., post, VAT extra.

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PCNProgramcards

Wacky Racers Card 2 of 9

8305WR2/9

```
350 PRINTCHR$(30)CHR$(10)CHR$(10)CHR$(10)"                 YOU  HAVE  CRASHE
D    "
360 PRINTCHR$(10)CHR$(10)"              ANOTHER GO ?"
370 IFSC>HSTHENHS=SC:GOSUB4000
375 A$=KEY$+KEY$+KEY$
380 GETA$:IFA$="R"THENGOSUB5000:CLS:GOTO11
390 IFA$="Y"THEN20ELSE400
400 PRINTCHR$(12)CHR$(29)CHR$(17)CHR$(6)"BYE BYE":END
500 SC=SC+10*ST
510 GOSUB4050
520 W=W+1:IFW=MWTHENLI=LI+1:PING:GOTO600
530 POKEX,32:X=N:GOTO60
600 POKEN,32:WAIT100:DE=DE+3*(DE>3)
602 W=0
604 IFSSTHEN30
605 ST=ST+1:IFST>MSTHENST=MS
610 GOTO30
999 END:REM*SET UP HIRES*
1000 RESTORE
1010 READV:IFV=-1THENRETURN
1020 FORI=46080+8*VTO46087+8*V
1030 READC:POKEI,C:NEXTI
1040 GOTO1010
1100 DATA97,0,0,3,6,30,6,3,0
1110 DATA98,0,0,8,8,28,62,34,0
1120 DATA99,0,0,1,14,62,30,12,4
1130 DATA100,0,0,48,24,30,24,48,0
1140 DATA101,4,12,30,62,14,1,0,0
1150 DATA102,0,17,31,14,4,4,0,0
1160 DATA103,8,12,30,31,28,32,0,0
1170 DATA104,0,0,32,28,31,30,12,8
1180 DATA105,0,30,51,45,51,30,0,0
1390 DATA-1
```

350	All lives lost, display prompt.
370	Update highest score if necessary.
375–400	Response to prompt and decode. "R" — Review and restart. "Y" — Restart. All others end program.
500–610	Update score, display it, add a life when bonus comes. Increase speed accordingly, choose appropriate circuit. Start again.
999–1040	Sub-routine to load data to Hi-res screen memory.
1100–1390	Data strings for the above sub-routine.

PCNProgramcards

Wacky Racers Card 3 of 9

8305WR3/9

```
1399 REM*DATA FOR CAR'S DIRECTION.*
1400 DATA-40,"b"
1410 DATA-39,"c"
1420 DATA1,"d"
1430 DATA41,"e"
1440 DATA40,"f"
1450 DATA39,"g"
1460 DATA-1,"a"
1470 DATA-41,"h"
1475 DATA6,2,3,1,4,5,7,8,9,10
1480 DATA@
1499 REM*TRACK DATA.*
1500 DATA"****************************************"
1502 DATA"***               i                *****"
1504 DATA"** i ****    *********              ****"
1506 DATA"**  ****    ***********              ***"
1508 DATA"**  ****   ***********     ******     **"
1510 DATA"**  ****   ***   i        ********    **"
1512 DATA"**  ***    ***     ***    *********    *"
1514 DATA"**         ***   ****     **********   *"
1516 DATA"****             ****     **********   *"
1518 DATA"******         ******     **********   *"
1520 DATA"******     **********     **********   *"
1522 DATA"*****     **********       *********   *"
1524 DATA"****   *              ** *  *******   **"
1526 DATA"****   *              ** **  *****    **"
1528 DATA"***      *******   *   i **  ****  *  **"
1530 DATA"** i     ********    **     *****i *  **"
1532 DATA"**  **  *********    ** **  *****  *  **"
1534 DATA"**  **  ***** i       * *i  ******     *"
1536 DATA"***  *  **    *******      ********    *"
1538 DATA"***  *       ********     **********   *"
1540 DATA"***  *  ******           **********    *"
1542 DATA"***     *****            *********     *"
1544 DATA"****                 **               **"
1546 DATA"*****                          i  *  ***"
1548 DATA"****************************************"
1549 DATA£,20,25,9,@
```

1399–1475	Data strings used in sub-routine at 2010–2190
1480–1549	Data strings used to format circuit 1. Used at 3000–3140

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PCNProgramcards

Fruit Machine Card 6 of 9

8305FM6/9

```
5700 REM*********** BAR **********
6000 DATA"B*A*R*■","       ■","B*A*R*■","       ■","B*A*R*■"
6010 DATA"          ■"
6020 REM ********** PLUM ********
6030 DATA"■       ","■     ","■       ■ ","■       ■ ","■       "
6040 DATA"        "
6050 REM ********** GOLD *********
6060 DATA" GOLD ■"," **** ■"," GOLD ■"," **** ■"," GOLD ■"
6070 DATA" **** ■"
6080 REM******* CHERRY ******
6090 DATA"         ■","      ■","     ■","     ■"
7000 DATA" ■    ■","          "
7010 REM ************ BELL ***********
7020 DATA"     ","          ","    ■ ","          ","     "
7030 DATA"        "
7040 REM *********ORANGE ?******
7050 DATA"        ","        ","     ■ ","     ■ ","        "
7060 DATA"        "
7070 REM******* CHERRY ******
7080 DATA"         ■","      ■","     ■","     ■"
7090 DATA" ■    ■","          "
8000 REM *********** BELL **********
8010 DATA"   _  ","          ","    ■ ","          ","     "
8020 DATA"        "
8030 REM ********** PLUM ********
8040 DATA"■       ","■     ","■       ■ ","■       ■ ","■       "
8050 DATA"        "
8060 REM *********ORANGE ?******
8070 DATA"        ","        ","     ■ ","     ■ ","        "
8080 DATA"        "
8090 REM ********** GOLD *********
9000 DATA" GOLD ■"," **** ■"," GOLD ■"," **** ■"," GOLD ■"
9010 DATA" **** ■"
9020 REM **********CHERRY ********
9030 DATA"         ■","      ■","     ■","     ■"
9040 DATA" ■    ■","          "
9050 REM ********** PLUM ********
9060 DATA"■       ","■     ","■       ■ ","■       ■ ","■       "
9070 DATA"        "
9080 REM ************ BELL ***********
9090 DATA"   _  ","          ","    ■ ","          ","     "
10000 DATA"        "
10010 REM *********ORANGE ?******
10020 DATA"        ","        ","     ■ ","     ■ ","        "
10030 DATA"        "
```

5700–10030 This card contains more data statements for wheel token initialisation.

PCNProgramcards

Fruit Machine Card 7 of 9

8305FM7/9

```
10040 REM *********BAR*********
10050 DATA"B*A*R*■","       ■","B*A*R*■","       ■","B*A*R*■"
10060 DATA"          ■"
10080 REM******* CHERRY ******
10090 DATA"         ■","      ■","     ■","     ■"
11000 DATA" ■    ■","          "
11010 REM *********ORANGE ?******
11020 DATA"        ","        ","     ■ ","     ■ ","        "
11030 DATA"        "
11040 REM ********** PLUM ********
11050 DATA"■       ","■     ","■       ■ ","■       ■ ","■       "
11060 DATA"        "
11070 REM ************ BELL ***********
11080 DATA"   _  ","          ","    ■ ","          ","     "
11090 DATA"        "
12000 REM*********** CHECK WIN ********
12005 A$=W$(F0,0):B$=W$(F1,1):G$=W$(F2,2):H$(1)="      ":H$(2)="      "
12006 H$(3)="      "
12500 IFA$="        "ANDB$=A$ANDG$=A$THENC=C+20:GOSUB15000:GOTO13000
12510 IFA$="B*A*R*■"ANDB$=A$ANDG$=A$THENC=C+50:GOSUB15000:GOTO13000
12520 IFA$=" GOLD ■"ANDB$=A$ANDG$=A$THENC=C+100:GOSUB15000:GOTO13000
12530 IFA$="■       "ANDB$=A$ANDG$=A$THENC=C+15:GOSUB15000:GOTO13000
12540 IFA$="   _    "ANDB$=A$ANDG$=A$THENC=C+12:GOSUB15000:GOTO13000
12550 IFA$="         ■"ANDB$=A$ANDG$=A$THENC=C+8:GOSUB15000:GOTO13000
12560 IFA$="         ■"ANDB$=A$ANDG$<>A$THENC=C+4:GOSUB15000:GOTO13000
12570 IFA$="   _    "ANDB$=A$ANDG$="B*A*R*■"THENC=C+10:GOSUB15000:GOTO13000
12580 IFA$="■       "ANDB$=A$ANDG$<>A$THENC=C+10:GOSUB15000:GOTO13000
12590 IFA$="        "ANDB$=A$ANDG$<>A$THENC=C+10:GOSUB15000:GOTO13000
12600 IFA$="■       "ANDB$=A$ANDG$="B*A*R*■"THENC=C+15:GOSUB15000:GOTO13000
12620 IFA$="B*A*R*■"ANDB$=A$ANDG$<>A$THENC=C+30:GOSUB15000:GOTO13000
12630 IFA$="         ■"ANDB$<>A$THENC=C+2:GOSUB15000:GOTO13000
12635 GOSUB15500
12640 HO=INT(RND(9)*2)+1
12645 PRINT"                          ■"
12650 IFHO<>1THEN13000
12660 PRINT"           HOLD 1 HOLD 2 HOLD 3 ■"
12680 GETHE$:IFHE$=""THEN12680
12690 IFHE$=" "THEN13000
12695 IFHE$="S"THEN20010
12700 IFHE$="1"THENH1=1:H$(1)="       ":PRINT"           HELD 1"
12710 IFHE$="2"THENH2=1:H$(2)="       ":PRINT"       ";LEFT$(AC$,17);"HELD 2"
12720 IFHE$="3"THENH3=1:H$(3)="       ":PRINT"       ";LEFT$(AC$,24);"HELD 3"
12730 GOTO12680
13000 PRINT"                   ";C;"■ "
13020 RETURN
```

10040–11090 Final data statements for wheel token initialisation.

12000	Routine to check for win lines.
12005	*A$. B$. C$* — Wheel 1, 2, 3.
12500–12630	Check wheel 1 first, then 2 and 3 where necessary. Sub-routine 15000 generates sound functions and 13000 displays score line and returns to main-line.
12635	More sound.
12640	Random hold.
12645	Clear hold feature line.
12650	No hold.
12660–12730	Hold selection and display.
13000	Display score line.
13020	Return to main-line.



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FROGGER & SPECMAN

FROGGER AND SPECMAN, two excellent games for the price of one! SPECMAN is probably the best version of its type with great machine code graphics and sound effects with 3 to 5 ghosts, power pills and a real munchie man who munches away in all directions, unlike cheaper versions!
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PCNProgramcards

Fruit Machine Card 8 of 9

8305FM8/9

```
13100 PRINT"■■■■■■■■■■■■SORRY YOU HAVE NO MORE CREDITS"
13105 PRINT"■■■■■■■■■■■DO YOU WISH TO PLAY AGAIN?"
13110 GETM$:IFM$="Y"THENRUN
13115 IFM$="N"THENPRINT"■":STOP
13120 M$="":GOTO13110
13130 PRINT"■■■                                              ":GOSUB12000
13140 GOTO1815
15000 POKE54296,15
15010 POKE54273,45:POKE54272,255:POKE54277,9:POKE54278,000:POKE54275,0
15020 POKE54274,255:POKE54276,17
15030 FORL=0TO100:NEXTL
15040 POKE54273,65:POKE54272,200:POKE54276,17
15065 FORL=0TO300:NEXTL:POKE54276,0
15070 GOSUB16000:RETURN
15500 POKE54296,15
15510 POKE54273,15:POKE54272,25:POKE54277,9:POKE54278,000:POKE54275,0
15520 POKE54274,255:POKE54276,33
15530 FORL=0TO500:NEXTL
15565 POKE54276,0
15570 GOSUB16000:RETURN
15999 :
16000 POKE54296,15
16010 POKE54273,32:POKE54272,55:POKE54277,9:POKE54278,000:POKE54275,0
16020 POKE54274,255
16070 RETURN
20010 PRINT"■■■■■■■■■■■■■■■■■■■PLAY AGAIN SOME TIME !!"
20015 PRINT"■■■■■■■■■■                       ■■■■■■■"
20020 POKE650,0
20030 END
25000 PRINT"■■■■■■■■■■YOU START WITH 10 CREDITS ON THE SLOT MACHINE.THESE DECREA
SE ";
25010 PRINT"BY 1 EACH TIME THAT YOU SPIN THE WHEELS.AT THE START OF THE ";
25020 PRINT"PROGRAM THE WINNING LINES AND THEIR VALUES WILL BE DISPLAYED.";
25030 PRINT"IF YOU WISH TO SEE THESE ONCE YOU HAVE STARTED PRESS 'F7'.TO ";
25040 PRINT"RETURN TO THE WHEELS PRESS ANY KEY."
25060 PRINT"■■THERE IS A HOLD FACILITY WHICH IS USED BY INDICATING THE NUMBER "
;
25070 PRINT"OF THE WHEEL(S) TO BE HELD (1-3).";
25080 PRINT"IT YOU WISH TO STOP THE PROGRAM "
25090 PRINT"■■■■■■■■■■PRESS 'SPACE' TO CONTINUE■"
25100 GETK$:IFK$<>" "THEN25100
25110 RETURN
28010 REM********THE ABOVE PROGRAM OCCUPIES 10K OF MEMORY ********************
29000 :
29010 :
```

13100–13120 The machine has won! Response for prompt is "Y" — replay: "N" — end. All others invalid.

13130–13140 Clear line, check for win, go to play loop.

15000–15070 A sound generator.

15500–15570 Another sound generator.

16000–16070 Yet another sound generator.

20010–20030 Program finished

25000–25110 Instructions.

PCNProgramcards

Fruit Machine Card 9 of 9

8305FM9/9

```
30010 REM+*+*+*+*+*HERE IS SOME HELPFUL INFORMATION*+*+*+*+*+*+*+*+*+*+*+*+*+*+
30020 REM         COLOR CODES
30030 REM"■"=BLACK
30040 REM"■"=WHITE
30050 REM"■"=RED
30060 REM"■"=CYAN
30070 REM"■"=PURPLE
30080 REM"■"=GREEN
30090 REM"■"=BLUE
30100 REM"■"=YELLOW
30110 REM"■"=ORANGE
30120 REM"■"=BROWN
30130 REM"■"=LIGHT RED
30140 REM"■"=GRAY 1
30150 REM"■"=GRAY 2
30160 REM"■"=LIGHT GREEN
30170 REM"■"=LIGHT BLUE
30180 REM"■"=GRAY 3
30200 REM+*+*+*+*+*+*+*+*+*POKE NUMBERS*+*+*+*+*+*+*+*+*+*+*+*+*+*+*+*+*+*+*+
30210 REM53280=BORDER COLOR
30220 REM53281=BACKGROUND COLOR
30230 REM650   =REPEAT KEY CONTROL
30240 REM-----------------------SOUND POKES------------------------- ---------
30250 REM  ATTACK/DECAY
30260 REM  54277    =VOICE 1
30270 REM  54284    =VOICE 2
30280 REM  54291    =VOICE 3
30290 REM  SUSTAIN/RELEASE
30300 REM  54278    =VOICE 1
30310 REM  54285    =VOICE 2
30320 REM  54292    =VOICE 3
30330 REM  HIGH FREQUENCY
30340 REM  54273    =VOICE 1
30350 REM  54280    =VOICE 2
30360 REM  54287    =VOICE 3
30370 REM  LOW FREQUENCY
30380 REM  54272    =VOICE 1
30390 REM  54279    =VOICE 2
30400 REM  54286    =VOICE 3
30410 REM  WAVEFORM
30420 REM  54276    =VOICE 1
30430 REM  54283    =VOICE 2
30440 REM  54290    =VOICE 3
30450 REM  VOLUME
30460 REM  54296
```

30010–30460 This makes the program so much easier to understand.

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PCNProgramcards

Parse Integer Card 1 of 1

8305SubPI

A subroutine to accept input from the keyboard as an alphanumeric string and verify its content with respect to numeric data.

Although written in Microsoft Basic, this routine can be modified for use on many machines. It can be defined as a procedure in BBC Basic.

```
4000 REM*******************************
4100 REM
4200 REM          PARSE INTEGER
4300 REM
4400 REM To parse in$ (keyboard input)
4500 REM and return N% (a whole number)
4600 REM or  mes$  (an error message).
4700 REM
4800 REM*******************************
4900
5000 N%  = 0

5100 sign% = 1
5200 start% = 1
5300 lng% = LEN( in$ )
5400 sym$ = LEFT$( in$, 1 )
5500
5600 IF sym$ = "-" THEN sign% = -1 : start% = 2
5700
5800    FOR le% = start% TO lng%
5900
6000      mes$ = null$
6100      sym$ = MID$( in$, le%, 1 )
6200
6300      IF (sym$ < "0") OR (sym$ > "9")  THEN mes$ = bad$
6400      IF mes$ = null$ THEN N% = 10 * N% + ASC( sym$ ) - base%
6500      IF mes$ <> null$ THEN le% = lng%
6600                         REM *** Abort loop
6700   NEXT le%
6800
6900 N% = sign% * N%
7000
7100 RETURN
7200
7300 REM:::::::::::::::::::::::::::::
```

5000 *N%* set to zero prior to calculation of return value
5100 *sign%* assumes +ve
5200 *start%* is initial value of decode loop
5300 *lng%* is length of input string
5400 *sym$* is initialised to 1st symbol in string
5600 If 1st symbol is "—" set *sign%* to –ve. Reset *start%* to next symbol position.
5800 Main loop
6000 Set return message to empty
6100 Extract symbol
6300 0-9 only allowed
6400 Update return value
6500 Error thus set *le%* to *lng%* so as to exit loop
6700 Round again
6900 Adjust for ± ve
7100 Return to main line

PCNProgramcards

Integer Test Card 1 of 1

8305IT

A small program to demonstrate the use of subroutine PARSE INTEGER

BBC Model B
BBC Basic
Application Example

```
1000 REM==================================
1100 REM
1200 REM         Integer test program
1300 REM
1400 REM==================================
1500
1600 null$ = ""
1700 bad$  = "** Illegal integer"
1800 base% = ASC("0")
1900
2000   FOR rep% = 1 TO 1
2100
2200     mes$ = null$
2300     PRINT
2400     INPUT "Number ", in$
2500     GOSUB 5000
2600     IF mes$ <> null$ THEN rep% = rep%-1
2700     PRINT
2800     PRINT mes$
2900     PRINT
3000
3100   NEXT rep%
3200
3300 PRINT "Legal integer : "; N%
3400
3500 STOP
3600
3700
3800
3900
```

1600 Set to empty string
1700 Error message
1800 Base ASCII 'O' value
2000 Loop start (reset in loop)
2200 Initialise error message to/from subroutine to empty
2400 Input any data
2500 Check input data for numeric only
2600 If not numeric have another attempt
2800 Error message displayed
3100 Only loop if error
3300 All OK
3500 Finished

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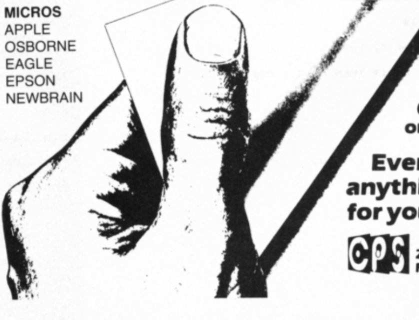
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	£2,760	CP/M		Boss	64K		●		●				F1	Seven stand alone modules. Can link to Autowriter & Autoindex.
	£805	CP/M	●	Cash Book Accounting	64K		●		●	●			S2	Also on CP/M-86 and MS-DOS. Amalgamation of sales, purchase & nominal ledger.
	£2,300.00	CP/M		dBFlex	48K		●		●	●			E1	Open item six module accounting system, (£575.00) per module. Works with dBase II.
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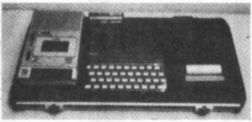
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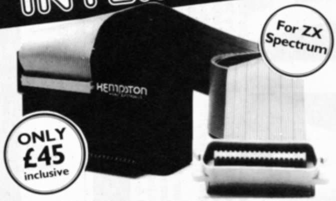
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	Spectrum £29.95		
	ZX81 £28.95		
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MICRO AIDS, Freepost, 2 Boston Close, Culcheth Warrington WA3 1BR. Tel: 092 576 2613

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	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied			Mail order avail.	Hardware Required			Publisher/ Distributor	Comments
						Cassette	Disk	Cartridge		Disk drive	Joystick	Other		
	£287.50	CP/M	●	Sales Ledger	64K		●		●	●			S2	Also on CP/M 86 and MS-DOS. Flexible ledger system.
	£45.42	Sharp MZ80A	●	Easy VAT	48K	●			●	●			K1	Also on Sharp M280B & M200K. VAT record system.
Agriculture	£1,150	Apple II		Dairy Package	64K		●			●			F2	Available on floppy or hard disk. Files individual cow production, with herd summaries
	£1,725	Apple II		Financial Management Program	64K		●			●			F2	Available on floppy or hard disk. Accounts for farm/estate management.
	£1,150	Apple II		Management Program	64K		●			●			F2	Available on floppy or hard disk. Monitors individual field activities, budgets, etc.
Bill of Materials	£373.75	CP/M	●	Fastbill	60K		●		●	●			T2	Also on MS-DOS & TRS-DOS. Will give parts explosion at 10 levels, 99 items/level.
Bookeeper	£56.35	Apple II		Apple Bookeeper	48K		●		●	●		●	H1	Needs printer. Keeps petty cash, sales, other business books, sorts, analysis etc.
Building Specifications	£460	Commodore 8000	●	National Building Specifications	32K		●		●	●			C3	Also on Commodore 4000. Used with Wordcraft. Produces building specifications.
Business Graphics	£471.50	16-bit machines		Micro-Graphpower	128		●		●	●		●	I2	Needs plotter. Business graphics which plots business data.
	£120.75	Apple III	●	Business Graphics	48K		●			●			P6	Also on Apple II (£125.35). Supports range of plotters & pie-charts, etc.
	£149.50	IBM PC	●	Graph Magic	96K		●		●	●			F1	Also on Apple II, III. Displays files graphically. Reviewed 18.3.83.
Business Management	£4,140	CP/M		Peach tree Business Management System	48K		●		●	●			P1	Also on MP/M & Unix. Available on hard disk (£6,900). Six modules for single user.
Cataloguing	£46.00	Apple II		Floppy Cat	48K		●		●	●			P4	Enables user to catalogue & store all information.
Estate Agents	£1,092.50	Apple II		Commercial Agency Systems	48K		●		●	●			C7	Matches in both directions with lists, labels and letters.
	£977.50	Apple II	●	Cyderpress Clients Recoverable Costs	48K		●		●	●			C7	Also on Rair Black Box. Designed to keep record of incurred expenditures.
	£1,121.00	Apple II	●	Cyderpress Residential System	48K		●		●	●			C7	Also on Rair Black Box. An applicant & property matching system.
	£419.75	CP/M		Estate Agents Match & Mail	56K		●		●	●			S4	Matches & prints out potential customers for every property.
Financial Accounting	£1,926.25	CP/M	●	Fast Range	60K		●		●	●		●	T1	Also on MS-DOS & TRS-DOS. Needs 132 character printer. 5 modules.
	£569.25	Commodore 8000	●	Finplan	16K	●			●				S5	Also on Commodore 3, 4, & 8000, Vic-20 and Commodore 64. £46.57 on floppy disk
	£287.50	Commodore 8096		Financial Director	32K		●			●			M3	Also on Hytec & ICL PC. 96K version available. Helps decide on financial strategy.
	£44.85	Commodore Pet		Busicalc	96K		●			●			D1	Designed to handle large & complex planning & financial applications.
Financial Planning	£188.60	Apple II	●	VisiCalc	48K		●		●	●		●	R1	Also on Apple III, Commodore & IBM PC, etc. The classic spreadsheet.
	£345.00	CP/M		Bottom-Line Strategist	48K		●		●	●			P4	A business/project forecasting program. Allows user to test business assumptions.
	£454.25	CP/M		Fastplan	64K		●		●	●			C5	Needs double density disks. A file based modelling system for business planners.
	£281.75	CP/M	●	Master Planner	64K		●		●	●			C5	Also on MS-DOS & CP/M 86. Needs 80 column printer. Upgrade of a spread sheet.
	£396.75	CP/M	●	Micro Plan	64K		●		●	●			B1	Also on MP/M. Spreadsheet financial planner.
	£343.85	CP/M		Minimodel Financial Modelling	48K		●		●	●		●	G1	Needs 80 column screen. Model consolidation facility, colour option.
	£182.85	CP/M	●	Multi-Plan	48K		●		●	●			P4	Also on PC-DOS, Cromix, Fortune, Corvus & Sirius. Second generation spreadsheet
	£44.85	CP/M		Plannercalc	64K		●		●	●		●	C5	Needs 80 column screen. Entry level system for spreadsheet planning.
	£218.50	CP/M		SP2020	48K		●		●	●			G2	Forecast effects of proposed actions. Aid to management decision-making.
	£172.50	CP/M		Supercalc	128K		●			●			A1	Electronic worksheet, representing a large flexible accounting work pad.
	£212.75	CP/M		Super Calculator	48K		●		●	●			E1	Spreadsheet calculator.
	£178.25	CP/M		T-Maker	48K		●		●	●			L1	Utility for analysis & presentation of numerical data & test material.
	£224.25	MS-DOS		Pulsar Business System	128K		●			●			A1	Consists of eight integrated packages & provides commercial accounting functions
	£339.25	Osborne	●	PADA/C	64K		●		●	●			P2	Also on CP/M. Two systems. Incomplete records accounting, time/cost recording.
	£632.50	UCSD-P System		Microfinesse	128K		●		●	●			D1	Financial modelling program for businessmen.
	£741.75	UCSD-P System	●	Micro-Modeller	48K		●			●		●	I2	Also on CP/M & MS-DOS. Designed for large corporations.
Industrial Costing	£747.50	Apple II	●	Stock & Production Costing	48K		●		●	●		●	A2	Also on Apple IIE & III & Sirius. Available on hard disk. Needs Pascal system.
Insurance Accounting	£1,380	Commodore 4000	●	Insurance Man	32K		●			●			C4	Also in Commodore 8000, provides insurance broker with sales ledger.
Insurance Broking	£5,462.50	ICL DRS20		HS-100	64K		●		●	●		●	H2	Requires 16 or 27 Mb hard disk to run off. Maintains client & policy records.
Integrated Software	£569.25	IBM PC		Context MBA	256K		●			●			B2	Also on Sirius & Victor. Comprises word processor database management system.
	£908.50	Commodore 8000	●	Silicon Office	256K		●			●			F1	Integrated spreadsheet modelling, graphics, WP, database & communications.
Invoicing	£323.75	CP/M	●	Fast Invoicing	60K		●		●	●			T1	Also on MS-DOS & TRS-DOS. Can link into Fast Sales & Fast Stock.
Linear Programming	£373.75	CP/M	●	Optimiser	48K		●		●	●			C6	Also on Apple. Management tool for optimizing the deployment of scarce resources
Local Authority	£862.50	Commodore 8000	●	P.U.S.W.A.	96K		●			●			M3	Also on Hytec. Monitors road holes under Public Utilities Street Work Act (1950).
	£569.25	Commodore 8000		Road Register	96K		●			●			M3	D-base network based on road names. Modules (£373.75) on street, lighting etc.
Mailing	£86.25	CP/M		Mailing List	56K		●		●	●			S4	Works with Super file. Prints labels, files, names & addresses. Mail merge facility.
Management	£226.16	CP/M	●	Scratch Pad 3.0	48K		●		●	●			M4	Also on CP/M 86, MS-DOS & PC-DOS. Spreadsheet using virtual memory.
Mathematics	£28.75	Commodore Pet	●	Infinite Arithmetic	16K	●			●				S5	Also on Commodore 3000, 4000 & 8000. Available on floppy disk.
Medical	£517.50	Apple II	●	Medical System	48K		●		●	●			A2	Also on Apple IIE, III & Sirius (£573.85). On hard disk. Age/sex register.
Office Information	£402.50	Apple II	●	Prophet II	48K		●		●	●			A4	Also on IBM PC & Corvus Concept. Information system which acts as a noticeboard.

Category	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied: Cassette	Media Supplied: Disk	Media Supplied: Cartridge	Mail order avail.	Hardware Required: Disk drive	Hardware Required: Joystick	Hardware Required: Other	Publisher/ Distributor	Comments
Payroll	£69.00	Apple II		Payroll	48K		●			●		●	H1	Also available as cassette for Spectrum ZX81 (£25.00). Needs printer.
	£287.50	Apple II	●	Tabs Payroll	48K		●		●	●			T3	Also on CP/M & MS-DOS (64K). Up to 2000 employees, nine pay schemes.
	£977.50	CP/M	●	Powerday	48K		●			●			O2	Also on MP/M and MS-DOS. Integrates with Omicrons nominal ledger. Handles SSP.
Project Management	£747.00	IBM PL	●	Micronet	48K		●			●			T2	Also on ICL PC, Sirius, Superbrain, Apple II, & others. Critical path analysis.
Project Planning	£1,150.00	Commodore 8000		Hornet	32K		●			●			C3	Has eight optional variants (all eight £4,025). Network logic & variety of screen display.
Property Management	£517.50	Apple II	●	Property Management System	48K		●			●			A2	Also on Apple III, Apple IIE & Sirius. Prints rent reminders, demands etc.
Purchase Ledger	£287.50	Apple II	●	Tabs Purchase Ledger	48K		●		●	●			T3	Also on CP/M & MS-DOS (64K). Open item ledger — automatic payment facility, etc
	£805.00	CP/M	●	Powerbought	48K		●			●			O2	Also on MP/M & MS-DOS. Integrates with Omicron's Nominal Ledger System.
Sales Ledger	£287.50	Apple II	●	Tabs Sales Ledger	48K		●		●	●			T3	Also on CP/M & MS-DOS. Part of integrated system. 300 analysis codes.
	£373.75	CP/M	●	Fast Sales	60K		●		●	●		●	T1	Also on MS-DOS & TRS/DOS. Needs 132 character printer. Part of Fast Range.
	£805.00	CP/M	●	Powersales	48K		●			●			O2	Also on MP/M & MS-DOS. Multi-user system based on mainframe software.
	£325	DEC Rainbow 100	●	Sales Ledger System	64K		●		●	●			D2	Also on DEC Mate II. Invoicing & monthly statement generating system.
Sales Order Processing	£805.00	CP/M	●	Compact Sales Order Processing	64K		●		●	●			C2	Also on CP/M 80, 86 & MS-DOS. Comes on hard disk. Control, stock, ledgers.
Sales, Purchase, Nominal Ledger	£1,207.50	CP/M	●	Compact Sales, Purchase & Nominal Ledger	64K		●		●	●			C2	Also on CP/M 80, 86 & MS-DOS. Follows Standard accounting procedures.
Sick Pay	£80.50	Apple II	●	Statutory Sick Pay (SSP)	48K		●		●	●			H1	Also on Spectrum. Does all SSP calculations.
Statistics	£172.50	Apple II	●	Inter-Stat	48K		●		●	●		●	G1	Also on Basis 108 & ITT 3030. Needs printer.
	£9.20	Sharp MZ80A	●	Statistical Analysis	48K	●			●				K3	Also on MZ80K. Calculates mean & standard deviation for up to 100 items.
	£15.00	Sinclair ZX81	●	Critical Path Analysis (CPA)	8K	●			●				H1	Also on Spectrum (16K). Activities entered from arrow diagram. Finds critical path.
	£977.50	UCSD-P System		Trend Plot	128K		●		●	●		●	P5	Needs Hewlett Packard Plotter. Developed to analyse historical time series data.
Stock Control	£373.75	CP/M	●	Fast Stock	60K		●		●	●		●	T1	Also on MS-DOS & TRS DOS. Needs 132 character printer.
	£3,289	CP/M		M-SIS	48K		●			●			T2	Stock control system for manufacturing industry.
	£33.92	Newbrain		Stock Control 40/4	32K	●			●				E2	Stores large quantities of stock, accumulates new stock levels & checks stock level.
	£25.00	Sinclair Spectrum	●	Stock Control	48K	●			●				H1	Also ZX81. Fast fwd/add/delete item. Prints complete or selective lists & total value.
Word Processing	£228.85	Apple II	●	Format 80	48K		●			●		●	P6	Also Apple IIE. Needs 80 column card. Storage/retrieval of names & addresses.
	£92.00	Apple II		Piewriter	48K		●		●	●		●	M5	Needs 80 column card. Allows entry, editing & print formatting of any text type.
	£125.35	Apple II		Wordhandler	48K		●		●	●			P4	Word processor for the non-professional — minimum Apple system.
	£152.95	Apple III	●	Apple Writer 2	48K		●			●			P6	Also Apple II. Has word wrap, glossary & word processing language.
	£28.50	BBC Model B		Alphabeta	32K	●			●				H3	Also available on disk. Suitable for home & business.
	£10.50	BBC Model B		Word Pro	32K	●			●				I4	Includes DELETE, INSERT, SAVE, Date etc.
	£90.85	Commodore 64		Infomast	64K		●		●	●			R2	Combined programmable word processor, Database and calculator.
	£89.00	Commodore 64	●	Paperclip	64K		●		●	●			A3	Also Commodore 8000. Compatible with WordPro & SpellPro.
	£488.75	Commodore 8000	●	Wordcraft	32K		●			●			D1	Also on SuperPet & Sirius 1. Routine correspondence, mailing, proposals, contracts.
	£51.75	Commodore Pet	●	Papermate +	16K	●			●				S5	Also on Commodore 64, 3, 4, & 8000. Available on floppy (£53.49).
	£125.00	Commodore BK-20	●	Wordcraft 20	8K			●	●			●	A3	Also Commodore 64 — needs printer. Comprehensive word processor.
	£145.00	CP/M	●	Mail Merge	64K		●			●			X1	Also on CP/M 86 and PC-DOS. An optional MERGE, PRINT, extra for Wordstar.
	287.50	CP/M	●	Peachtext	48K		●			●		●	P1	Also MP/M & MS-DOS. Needs high quality printer. Contains proof reader.
	£339.00	CP/M	●	Perfect Writer/Speller	64K		●		●	●			S3	Also MS-DOS & Apple DOS. Contains quick reference card.
	£431.25	CP/M	●	Select Word Processing System	64K		●		●	●			B1	Also MP/M & PC/DOS. Screen-oriented system.
	£316.25	CP/M	●	Spellbinder	48K		●		●	●			E1	Also on Oasis. Word processing & office management system.
	£333.50	CP/M		WP2020	48K		●		●	●			G2	Menu-driven, machine independent. Set of key-tops provided.
	£225.00	IBM PC		Easywriter II	64K		●			●			X1	Bold face & underscoring on screen. 80,000 word spell checker extra (£43.15).
	£340.40	IBM PC		VisiWord	64K		●			●		●	R6	Mail merge facility with Visi file.
	£339.25	MS-DOS	●	WordStar	128K		●			●		●	A1	Also on CP/M. Needs printer. Complete screen-based WP.
	£40.25	Newbrain		Word Processor 40/12	32K	●			●				E2	Automatic word wrap, editing, saving paragraphs, deleting.
	£325.00	OS9		Stylograph	32K		●			●			S6	Expandable system with modular design.
	£45.42	Sharp MZ804	●	Wordpro	48K	●			●				K1	Also on MZ80B+K. Available on disk (£91.94). One of few WP packages for Sharp.
	£49.95	Tandy TRS 80 I	●	AJ Edit	32K		●		●	●		●	M6	Also on Genie I & II. Needs printer.
EDUCATION														
Basic Course	£9.95	Texas Instruments 99/4A		Beginners Basic Tutor	16K	●			●				T5	Gives explanations and examples of TI Basic — lets the user try.
	£13.95	Texas Instruments 99/4A		Teach Yourself Extended Basic	16K	●			●				T5	Needs extended Basic module.
Business Game	£9.95	BBC Model A	●	Business Game	16K	●			●				W1	Also on Model B. Two games for economics, business & general studies, teaching.

	£6.84	BBC Model A	●	Inkosi	32K	●			●				C9	Also on Model B. Rule for ten years, overcoming obstacles, e.g. famines.
Chemistry	£14.38	Research Machine 380Z	●	Symbols To Moles	31K		●		●	●			H4	Also on Apple II. Practise using chemical symbols, writing & mole concept.
Children	£37.89	Apple II		Bumble Plot	48K		●		●	●			P4	A set of five programs for developing graphics and maths skills. For children 8 to 13.
	£29.84	Apple II	●	Face Hanger	48K		●		●	●			P4	Also on IBM PC. Designed for children to learn computer keyboard by building up face.
	£37.89	Apple II		Gertrude's Secret	48K		●		●	●			P4	An educational game to teach logical thinking & planning. For children aged 6-9.
	£9.80	Atari 400	●	Jigsaw Puzzles	16K	●							T4	Also on Atari 800. Has 16 puzzles and optional difficulty.
	£11.40	BBC Model B		Letters	32K	●			●				C9	Designed for children aged 4-6 & for dyslexic & remedial children.
	£11.40	BBC Model B	●	Metrics	32K	●			●				C9	Also on Vic-20. Vocabulary and structure of metric system, for children aged 10-15.
	£6.84	BBC Model B	●	Pascal	32K	●			●				C9	Also on Vic-20. Shows construction of Pascal Triangle and tests on it.
	£6.84	BBC Model B	●	Sequences	32K	●			●				C9	Also on Vic-20. Demonstrates number patterns.
	£6.50	BBC Model B		The Early Stages	32K	●			●				H3	Reading aid. Plays nursery rhymes. Available on disk.
	£4.50	BBC Model B		Super Hangman	32K	●			●				I4	Version of famous game. High resolution graphics. 800 words or enter own choice.
	£9.95	BBC Model B		Tree of Knowledge	32K	●			●				A9	Interactive program teaching categorisation. Simplified information retrieval.
	£4.95	Sharp MZ80A	●	Giant Maths	32K	●			●				S8	Also on MZ80K. Big screen figures & humorous error messages. 5 to 11 years.
	£4.95	Sharp MZ80A	●	Rocket	3K	●			●				S8	Also on MZ80A. Four difficulty levels. For five to 11 year olds.
	£9.20	Sharp MZ80A	●	Teach Tables	48K	●			●				K3	Also on MZ80K. Plays like game but motivates children to improve their ability.
	£4.95	Sharp MZ80K	●	Master Builder	48K	●			●				S8	Also on MZ80A. Repair a wall using random blocks. Teaches spacing.
Classroom Monitor	£322.00	UCSD-P	●	Classroom Monitor	64K		●		●	●			K4	Also on Apple II. Provides demonstration facilities & monitors student's progress.
Economics	£28.75	Sharp MZ80K	●	Broadwater Economics Simulation	16K	●			●				W1	Also on Commodore Pet & BBC. Simulates micro & macro economics.
French	£14.38	Research Machine 380Z	●	Repondez	31K		●		●	●			H4	Also on Apple II. Practising French verb formation (present tense).
	£9.20	Sharp MZ80A	●	French Conjugate	48K	●			●				K1	Also on MZ80K. Automatically conjugates regular verbs into tenses.
	£9.20	Sharp MZ80A	●	French Verbs	48K	●			●				K1	Also on MZ80K. Allows user to impart up to 20 verbs & eight tenses at a time.
Graphics	£8.00	BBC Model B	●	Painter	32K	●			●				A5	Also on Spectrum (£5.75), Atom (£6.90) & on disk.
	£9.95	BBC Model B		Creative Graphics	16K	●			●				A9	Book available (£7.50). Designed to illustrate BBC graphics.
History	£20.13	Sharp MZ80A	●	Kings & Queens	48K	●			●				K1	Also on MZ80K. Facts & figures on English monarchs since 1066.
Languages	£7.95	Sharp MZ80A	●	Multilinguist	3K	●			●				S8	Also on MZ80K. A language tutor to suit all European languages.
Mathematics	£10.30	BBC Model B		Angle	32K	●			●				C9	Includes four programes designed to teach simple geometry.
	£9.95	BBC Model A	●	Algerbraic Manipulations	16K	●			●				W1	Also on Model B. Includes four programs designed for use in maths teaching.
	£82.80	IBM PC		Fact Track	64K		●			●			I3	Learning basic arithmetic. Presents simple two-line sums in random order.
	£46.00	Sharp MZ80A	●	Curve Fitting	48K	●			●				K3	Also on MZ80K. Calculates, intercepts & plots power curve.
	£9.20	Sharp MZ80A		Directed Numbers	48K	●			●				K3	Also on MZ80K. Teaches difficult mathematical functions.
	£9.20	Sharp MZ80A	●	Divisor Advisor	48K	●			●				K3	Also on MZ80K. Teaches division at a variety of skill levels.
	£27.60	Sharp MZ80A	●	Numerical Integration	48K	●			●				K3	Also on MZ80K & B. Teaches Simpson's Rule.
Meteorology	£23.00	Research Machines 380Z	●	Weather	31K		●		●	●			H4	Also on Apple II. Gives synoptic charts. Teaches elementary meteorology.
Morse Code	£9.20	Sharp MZ80A	●	Morse Tutor	48K	●			●				K3	Also on MZ80K. Used to teach morse code by sight and sound. At seven levels.
Physics	£14.38	Research Machines 380Z	●	Lenses	31K		●		●	●			H4	Also on Apple II. Illustrates formation of images by lenses using ray diagrams.
	£9.20	Sharp MZ80A	●	Casino Chips	48K	●			●				K3	Also on MZ80K. Uses radioactive chips to teach half-life concept.
Typing	£28.75	CP/M	●	Touch'n'Go	48K		●		●	●			C6	Also on MS-DOS. Typing tutor for mastering numeric pad & Qwerty keyboard.
	£31.05	IBM PC		Typing Tutor	64K		●			●			I3	Presents exercises for learning touch typing or for improving existing skills.

GAMES

Adventure	£17.95	Atari	●	Arrow of Death	16K	●			●				C8	Also runs on TRS-80, BBC, Vic-20. A 'classic text adventure'.
	£7.99	BBC Model B	●	Adventure	16K	●			●				M7	Also runs on Atom. 'Many rooms to explore and many hazards to overcome'.
	£9.95	BBC Model B		Philosopher's Quest	16K	●			●				W1	'Progress through a world of fiendish puzzles.'
	£9.95	BBC Model B		Sphinx	16K	●			●				W1	'A classic adventure, moving through caves avoiding hazards to collect treasure'.
	£13.80	Commodore Pet	●	Hitch-Hikers Guide to the Galaxy	32K	●			●				S5	Also runs on Commodore 64, Vic-20, 3000, 4000, 8000. 'Involved, textual game'.
	£18.40	Commodore Pet		Pythonesque	32K	●			●				S5	'Increasingly difficult textual game based on Monty Python'. Disk available (£20.12).
	£24.99	Commodore Vic-20		River Rescue	8K			●			●		T4	Needs joystick. 'Captain boat through treacherous rivers to rescue explorers'.
	£8.00	Dragon 32		Escape	32K	●			●		●		M16	Needs joystick. 'A 3D maze game. Get clues from 15 rooms for code of elevator'.
	£8.00	Dragon 32		Flipper	32K	●			●				M16	'A game of intrigue and strategy. Requires an agile mind and a lot of fore-thought'.
	£8.00	Dragon 32		Mansion Adventure	32K	●			●				M16	'Wind your way through an old mansion picking up clues to find the diamond',
	£7.95	Dragon 32		Wizard War	32K	●			●		●		S7	Needs joystick. 'Magical combat for two to nine players; interactive duel'.
	£35.00	IBM PC		Adventure in Serema	64K		●					●	I3	Needs colour graphics adaptor and direct drive colour monitor for use.
	£6.90	Oric	●	Zodiac	16K	●			●				A5	Also runs on Atom. 'A thinking persons adventure game'.
	£12.07	Sharp MZ80A	●	Adventure	48K	●			●				K1	Also runs on Sharp MZ80B and MZ80K. 'An interactive adventure game'.
	£12.07	Sharp MZ80A	●	Quest	48K	●			●				K1	Also runs on Sharp MZ80B and MZ80K. 'Dungeons & Dragons type game'.

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied			Mail order avail.	Hardware Required			Publisher/ Distributor	Comments
						Cassette	Disk	Cartridge		Disk drive	Joystick	Other		
	£7.95	Sharp MZ80K	●	Nightmare Park	48K	●			●				S8	Also runs on MZ80A. 'Cross Nightmare Park. Every few steps play game or task'.
	£7.95	Sharp MZ80K	●	Tombs of Karnak	48K	●			●				S8	Also runs on MZ80A. 'Bargain for items required before entering tombs'.
	£5.95	Spectrum		Faust Folly	16K	●			●				A6	'A 16K adventure with the same traps, magic, fiends, treasure as the 48K game'.
	£14.95	Spectrum		The Hobbit	48K	●			●				M8	'Object is to get treasure. For one player. Can instruct computer in ordinary English'.
	£5.00	Spectrum	●	Orb	16K	●			●				I5	Also runs on Dragon 32 and Commodore Vic-20. 'Explore labyrinth and destroy Orb'.
	£10.00	Spectrum	●	Pimania	48K	●			●				A7	Also runs on Sinclair ZX81, BBC 13, Dragon 32. Reviewed 18.3.83.
	£5.00	Spectrum	●	The Quest	48K	●			●				I5	Also runs on Dragon 32. 'Fighting adventure game'.
	£5.00	Spectrum	●	Star Trek	48K		●		●	●			I5	Also runs on Dragon 32 and Commodore Vic-20. 'Hunt down the Klingon in space'.
	£5.95	Spectrum		Slippery Sid	16K	●			●		●	●	S9	Needs joystic and keyboard to use. 'Snake type game'.
	£10.06	Tandy TRS-80 I	●	Mysterious Adventurer	16K	●			●				M6	Also runs on Tandy TRS-80 III, Genie I, II, Colour Genie and BBC B.
	£3.95	Texas Instruments 99/4A		Chalice of Kalmar	16K	●			●				A8	'The aim is to retrieve a chalice from a temple'.
	£4.95	Texas Instruments 99/4A		Forbidden City	16K	●			●				A8	'You have to explore a deserted alien city with many hazards on the way'.
	£3.95	Texas Instruments 99/4A		Sorcerers' Castle	16K	●			●				A8	'You are trying to rescue the captured princess'.
	£7.50	BBC Model B		Atlantis	32K	●			●				I4	'Guide submarine through caverns & destroy enemy'.
Arcade type	£9.99	Commodore Vic-20		Night Crawler	5K	●			●				R2	'A Centipede style game. Fast action, graphics and sound effects'.
	£5.50	Spectrum	●	Arcadia	16K	●			●				I6	Also on Commodore Vic-20. '12 levels of aliens attacking in different ways'.
	£5.95	Spectrum		Ground Attack	16K	●			●				S9	'Variable speeds allows this game to be played by everyone'.
	£5.95	Spectrum		Orbiter	16K	●			●				S9	'The only version of this Defender style game that is available for the Spectrum'.
	£5.95	Spectrum		Cyber Rats	16K	●			●		●	●	S9	Needs joystick and keyboard to run.
Asteroids type	£4.95	Spectrum		Meteor Storm	16K	●							Q1	'Progressive difficulty, variety of controls'.
	£6.95	Spectrum		Time-Gate	48K	●			●				Q1	'Time travel, 3D graphics, colour, cockpit view and instrument display'.
	£4.95	ZX81		Asteroids	4K	●			●				S9	'Fast moving, suitable for all ages'.
Centipede type	£7.99	Dragon 32		Caterpillar	32K	●			●		●		M16	'A new generation munching game'.
Chess type	£7.99	BBC Model B		Chess	16K	●			●				M7	'Machine code, high resolution graphics with many play options'.
	£24.95	Dragon 32		Cyrus Chess	32K			●					D3	'Won European microcomputer chess championship 1981. Nine levels of difficulty'.
	£14.50	Sharp MZ80A	●	Chess	48K		●	●					K1	Also on Sharp MZ80B & MZ80K. '14 levels of difficulty'.
	£42.95	Texas Instruments 99/4A		Chess	16K		●	●					T5	'Different difficulty levels. Will solve problems. Can teach chess'.
Darts	£19.99	Atari 400	●	Darts	8K	●					●		T4	Also on 800. 'Aim & throw — the computer does the arithmetic'.
Defender type	£22.80	Atari 400/800	●	Submarine Commander	16K			●		●			T4	'One player. Nine levels of difficulty. Destroy shipping. Oxygen levels, fuel etc'.
	£9.95	BBC Model B		Planetoid	32K	●			●				A9	'A game of speed & skill'. Available on floppy disk (£11.50).
	£7.95	Commodore Vic-20		Alien Blitz	5K	●			●		●		A3	Needs joystick to run. 'Difficulty levels, colour & sound'.
	£9.99	Commodore Vic-20		Annihilator	3K	●			●		●		R2	'Based on Defender'.
	£6.95	Spectrum		Penetrator	48K	●			●				M8	'Two levels of difficulty difficulty'.
	£21.95	TI 99/4A		Parsec	16K			●	●				T5	'Increasingly difficult. After four onslaughts pass through to next stage'.
Flight Simulator	£22.80	Atari 400	●	Jumbo Jet Pilot	16K	●					●		T4	Also Atari 800. 'Ten difficulty levels. View through cockpit with flight instrumentation'.
	£7.95	Spectrum	●	Flight Simulation	48K	●			●				S10	Also on ZX81 (£5.95). 'Shows control panel & control view'.
	£17.20	Tandy TRS-80	●	Jumbo	16K	●			●				M6	Also on Genie I, II & BBC Model B. 'Simulation of piloting a Jumbo'.
	£3.95	Texas Instruments 99/4A		Bomber	16K	●			●				A8	Also available on disk. 'Must land plane & bomb skyscrapers'.
Football	£29.99	Atari 400	●	Kick Back	8K			●			●		T4	Also available on Atari 800. Needs joystick to run. 'Beat the high score'.
	£19.55	Atari 400	●	Soccer	8K			●					T4	Also on Atari 800. 'Aerial view of field.' Reviewed 11.3.83.
Frogger type	£5.50	Commodore Vic-20		Wacky Waiters	3.5K	●			●				I6	'Waiter serving drinks in hotel. Has to hop from lift to lift'.
	£9.99	Commodore Vic-20		Hopper	3K	●			●		●		R2	'A version of Frogger'.
	£5.95	Spectrum		Horace Goes Ski-ing	16K	●			●				S10	'Sequel to Hungry Horace. He must cross busy road, fetch skis & ski down slope'.
Golf	£7.95	Dragon 32		Golf	32K	●			●				S7	'For one or two players. Full handicapping system'.
	£3.75	Spectrum		Golf	16K	●			●		●		R3	'For one or two players. Choice of nine or 13 holes'.
	£3.75	Sinclair ZX81		Golf	16K	●			●		●		R3	'Similar to other golf games, in black and white'.
Helicopter	£24.95	Commodore Vic-20	●	Chop Lifter	8K			●	●		●		A3	Also on Commodore 64. Needs joystick to run. 'Vic version of USA's best-seller'.
Jigsaw	£14.99	Atari 400	●	British Heritage Jigsaw Puzzle	8K	●							T4	Also on Atari 800. 'Educational game with selective difficulty'.
Kong type	£7.95	Commodore Vic-20		Bonzo	8K	●			●		●		A3	'Workman dodges robots on split-level. Sound & full graphics.
	£8.00	Dragon 32		Donkey King	32K	●			●		●		M16	'Popular arcade game'.
	£9.95	BBC Model B		Monsters	32K			●					W1	'The player has to run up & down ladders & along walls, pursued by monsters'.

Maze type	£24.95	Dragon 32		Ghost Attack	N/A			●			●		D3	'The aim is to avoid & eliminate ghosts which roam a maze'.
	£8.00	Dragon 32		Jerusalem Adventure	32K	●			●				M16	'Aim is to get treasure & avoid being eaten'.
	£5.95	Spectrum		Hungry Horace	16K	●			●				S10	'Animated maze game with sound & full graphics'.
	£5.95	Spectrum		Muncher	16K	●					●		S9	'A monster munching marathon'.
	£8.00	Spectrum		Spectres	16K	●							B3	'An increasingly difficult maze game. The object is to fit light bulbs & destroy ghosts'.
	£10.00	Sinclair ZX81		Mazogs	16K	●							B3	'Three levels. Find & collect treasure in a maze & escape'.
Pacman Type	£9.95	BBC Model B		Snapper	16K	●			●		●		W1	'Based on Pacman'.
	£9.50	Colour Genie		Chomper	16K	●							K2	'Based on Pacman'.
	£8.00	Dragon 32		Scarfman	32K	●			●				M16	'Based on Pacman'.
	£4.95	Spectrum		Gnasher	16K	●			●				R3	Joystick optional. 'Based on Pacman using Beano characters'.
Pool	£8.50	BBC Model B		Billiards	32K	●			●				H3	Available on disk. 'A game for all ages'.
Racing	£7.95	Dragon 32		Grand Prix	32K	●			●		●		S7	'For one or two players, features eight Grand Prix tracks & 10 levels of difficulty'.
	£21.95	TI 99/4A		Car Wars	16K			●	●				T5	'Race through maze whilst avoiding computer controlled car'.
Shooting	£29.95	Atari 400	●	Claim Jumper	16K			●	●		●		C8	Also on Atari 800. 'A two player shoot-out over gold nuggets & cash'.
	£29.95	Atari 400		Shamus	16K			●	●		●		C8	'Player has to move through lair avoiding hazards'.
	£6.84	BBC Model B	●	Invisible Man	32K	●			●				C9	Also on Commodore Vic-20. 'Aim is to shoot man who keeps disappearing'.
	£9.99	Commodore Vic-20		Quacker	3K	●			●		●		R2	'Aim is to shoot down ducks & rabbits on shooting gallery'.
	£19.95	Commodore Vic-20	●	Spiders of Mars	N/A			●	●				A3	'Popular game for the Vic-20'. Also on Commodore 64.
	£5.95	Spectrum		High Noon	16K	●			●		●		A6	'Clean up chaos & disorder in town'.
Space	£9.95	Dragon 32		Dragon Trek	32K	●			●		●		S7	'A version of Star Trek with ten levels of difficulty'.
	£5.95	Spectrum		Android Run	16K	●			●		●		A6	'Control android to shoot walls, kill mutants & reach central complex'.
	£5.95	Spectrum		Cosmos	16K	●			●		●		A6	'Defend space convoy from aliens & asteroids'.
	£5.50	Spectrum		Schizoids	16K	●			●				I6	'Space bull-dozer nudges shapes into black hole'.
	£4.95	Spectrum	●	Star Trek	48K	●			●				R3	Also on ZX81 (£3.95). 'One player, sound & full colour graphics strategy game'.
Space Invader type	£7.99	BBC Model B		Swoop	32K	●			●				M7	'Written in machine code with full colour & high resolution graphics'.
	£7.50	BBC Model B		Model B Invaders	32K	●			●				I4	'A Space Invaders game with high resolution & colour graphics'.
	£9.99	Commodore Vic-20		Orbis	3K	●			●		●		R2	'Based on Missile Command. Fast & colour'.
	£19.95	Dragon 32		Cosmic Invaders	N/A			●					D3	Joystick optional. '15 levels of difficulty'.
	£6.50	Spectrum		Destroyer	16K	●			●				I5	'Destroy the varying alien invaders'.
	£4.95	Spectrum		Intruders	16K	●			●				Q1	'Includes mutants, random saucers, bonus base & 14 different aliens. Sound & colour'.
	£5.00	Spectrum		Spectral Invaders	16K	●							B3	'For one or two players. Increasingly difficult, high resolution colour graphics'.
	£21.95	TI 99/4A		Invaders	16K			●	●				T5	'Based on Space Invaders. After every two screens a new character appears'.
	£3.95	Sinclair ZX81		Invaders	4K	●			●				S9	'Based on Space Invaders'.
Sport	£33.35	IBM PC		Decathlon	64K		●			●		●	I3	Needs colour graphics adaptor & direct drive colour monitor. 'For up to six players'.
Variety	£5.95	Commodore Vic-20		Innovation Cassette	48K	●			●				M8	'One tape containing seven games'.
	£5.95	Spectrum		Over the Spectrum	16K	●			●				M8	'One tape with 10 games. Defender to geometry, beginners to advanced'.
Various	£29.95	Atari 400	●	Picnic Paranoia	16K			●	●		●		C8	Also on Atari 800. Needs joystick to run. 'A graphics game based on picnic site'.
	£4.95	Colour Genie		Breakout	16K	●			●		●		M9	'Different levels of skill'.
	£6.95	Commodore Vic-20		Amok	5K	●			●				A3	'Chased by robots in enclosed room. Different levels of difficulty'.
	£9.95	Commodore Vic-20		Black Squid	3K	●			●		●		C8	'Get men to shore in shortest time'.
	£24.95	Commodore Vic-20		Mutant Herd	8K			●			●		T4	'Protect a powerhouse from mutants. Enter their burrows & destroy eggs'.
	£6.90	Dragon 32		Dead Wood	32K	●			●				A5	'A game for all the family'.
HOME														
Clubs and Sports	£78.00	Sharp MZ80A		Clubman	48K	●			●				S8	Golf handicapping and competition results system complying with 1983 regulations.
	£575.00	Apple II	●	Tabs Golf Package	48K		●		●	●			T3	Alsom on MS/DOS (64K). Maintains members handicaps including 1983 regulations.
	£28.18	Epson HX20	●	Horse Race Forecast	48K	●			●				K1	Also on Newbrain and Sharp. A punters aid to betting.
	£28.69	Sharp MZ80A	●	Navex	48K	●			●				K1	Also on MZ80K. Simulations of navigating a yacht on the English Channel.
Diary	£9.95	BBC Model A	●	Desk Diary	16K	●			●				W1	Also on BBC Model B. Consists of address book & diary planner (plus instructions).
Home budget	£19.99	Atari 400	●	Home Financial Management	8K	●						●	T4	Also on Atari 800. Needs Atari Basic cartridge. Aids money management.
	£19.95	Epson HX20	●	Home Budget	16K	●			●				K1	Also on Sharp, MZ80 & Osborne. Keeps records of home finances with graphics.
	£14.95	Sharp MZ80A	●	Sam Analysis	3K	●			●				S8	Designed for balancing home debits & credits.
Music composition	£24.99	Commodore Vic-20		Vic Music Composer	8K			●					I4	Aids to aspiring composer. Also for entertainment and education.
Stock control	£10.00	Spectrum		Spec File	48K	●			●				A5	Stock control program useful in home, e.g. record collection, etc.
Various	£12.95	Commodore Vic-20		Home Office	5K	●			●				A3	Comprises VicPro (word processor) & VicData (A database program).

UTILITIES

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied: Cassette	Media Supplied: Disk	Media Supplied: Cartridge	Mail order avail.	Hardware Required: Disk drive	Hardware Required: Joystick	Hardware Required: Other	Publisher/ Distributor	Comments
Basic	£201.25	CP/M		Basic 80	48K		●		●	●			L1	Industry standard Basic.
	£235.70	CP/M		Basic Compiler	48K		●		●	●			L1	Companion to Basic 80. Allows programs to run faster.
	£80.50	CP/M		BDS C Compiler	48K		●		●	●			L1	A subset of 'C' that enables its implementation. Includes symbolic debuggers.
	£121.90	CP/M	●	C Basic	64K		●			●			X1	Commercial Basic. Also on CP/M86 (£265.65).
	£213	Any Z80		X-Basic	48K		●			●			X1	Built-in matrix functions. Supports MP/M record locking. Graphics option.
Basic Upgrader	74.75	Commodore 64	●	VicTree	64K	●			●				S5	Also Commodore Vic-20. Also on floppy (£92.00). Adds 50 commands to Basic.
Card Index System	£215.05	Apple II	●	Visidex	48K		●			●		●	R1	Also on IBM PC. Needs printer. One record/screen designed for cross-referencing.
	£178.25	CP/M	●	Cardbox	48K		●		●	●		●	C6	Also on MS-DOS. Needs 24×80 VDU & 100K disk storage.
Communications	£102.35	Apple II		ASCII Express — The Professional	48K		●		●	●		●	P4	Needs RS232. Asynchronous serial communications package.
	£448.50	Apple II		Editel	48K		●		●	●		●	O1	Needs modem. A Viewdata frame word processor designed to aid data editing.
	£626.75	Apple II		Owlsync 3780	48K		●		●	●			O1	A full IBM 3780 emulator package allowing communication up to 2400 Baud.
	£454.25	Apple II		Owltel	48K		●		●	●		●	O1	Needs modem. Allows access to Prestel & private viewdata systems.
	£149.50	Apple II	●	Terminal Utilities	48K		●		●	●			C1	Also on Apple IIE. Converts Apple II to intelligent terminal. Speeds of up to 9600 BPS.
	£57.50	CP/M		Xcopy 1.0	64K		●		●	●			X1	Disk copy utility for Cromemco machines. Copies 8" or 5¼" single/double sided.
	£454.25	CP/M	●	Micro-Linkline	64K		●		●	●			I2	Also on UCSD-P. Teletype comms for transferring datafiles.
	£575	CP/M	●	Bisync AC-3780	64K		●		●	●			E1	Also on MP/M & CP/M86. Micro to mainframe comms through IBM terminal emulation.
	£41.40	IBM PC		Asynchronous Communications	64K		●			●		●	I3	Needs asynchronous comms adaptor. Makes PC act as asyncs comms terminal.
	£117.30	IBM PC		IBM 3101 Emulation Program	64K		●			●			I3	Makes PC act as 3101 terminal provides 3270 emulations when connected to host.
	£638.25	IBM PC		PC SNA 3270 Emulation	128K		●			●		●	I3	Needs SDLL adaptor card makes PC act as IBM 3270 terminal.
	£22.43	Sharp MZ80A	●	Zen	48K	●			●				K1	Also MZ80K & B. Full Z80 editor/assembler.
	£115.00	IBM PC	●	Interlink	48K		●			●			T2	Also on Sirius, Apple II, Xerox, Osborne etc. Connects processors for downloading.
Database	£132.25	Apple II		DB Master	48K		●		●	●			M5	Available on hard disk. Allows 1K records over 100 fields. Report generation, etc.
	£224.25	Apple II		Informex Database System	48K		●		●	●			I1	Database system which can be used to & update info on any type of record.
	£402.50	Apple II	●	Mailist	48K		●		●	●		●	A4	Also for IBM PC & Corvus Concept. Requires hard disk. A networking product.
	£96.60	Apple III	●	PFS: File	48K		●			●			P6	Also for Apple II (£135.70). Used in tandem with PFS (£96.60).
	£215.05	Apple II	●	VisiFile	48K		●			●			R1	Also on IBM PC (£273.70; 64K). A database program suitable for up to 500 entries.
	£217.35	Apple IIE		VisiTrend + VisiPlot	64K		●		●	●			R6	Also for CP/M. Graphic representation of data. Compatible with VisiCalc.
	£10.30	BBC Model B		Filer	16K	●			●				M7	Allows searching, sorting, saving & recovery of data.
	£201.25	CP/M	●	Dataflow II	56K		●		●	●			G1	Also on CP/M 86. Needs 160K disk space. Extract files to link with other systems.
	£201.25	CP/M		Datastaff	64K		●			●			X1	Data entry & retrieval system. Interfaces with WordStar.
	£499.74	CP/M		dBase II	48K		●		●	●			E1	Micro DBMS. Can be used for high level programming for a range of applications.
	£557.50	CP/M		Superfile	56K		●		●	●			S4	Multi-file database giving application package information.
	£166.75	CP/M		Supersort I16	64K		●		●	●			M10	A sort utility for handling various forms of data files. Mainframe-like additions.
	£1,840	CP/M	●	MDBS II	64K		●						T2	Also on CPIM86, MS-DOS, Turbo DOS, Unix and Xenix. Mainframe — like facilities.
	£68.42	Newbrain		Invoice & Credit Program	32K	●			●				E2	The invoice program allows you to put in your own information and design invoice.
	£29.32	Newbrain		Database 40/S	32K	●			●				E2	Information gatherer, stores large quantity of information & can be interrogated at will.
Debugger	£258.75	CP/M	●	Animator	64K		●		●	●			M11	Also on UNIX & MS100S, interactive source level debugging tool for CIS-Cobol.
File Transfer	£132.25	CP/M		BSTAM	16K		●		●	●		●	L1	Needs common interface ports or modem access. Utility for transfering CP/M files.
Graphics	£34.50	Apple II	●	Graphic Utilities	48K		●		●	●			C1	Also for Apple IIE. Parameter driven machine code programs' high res graphics.
	£24.95	Atari		Constructor	48K		●		●	●	●		C8	Less experienced & new programmers can design animated sequences.
	£9.95	BBC Model A	●	Creative Graphics	16K	●			●				W1	Also for BBC model B. 30 programs on cassette produce range of pictures & patterns.
	£24.95	BBC Model B		EDG Graphics Package	32K	●			●				S7	Computer aided design package. Reviewed 11.3.83.
	£50.60	CP/M		CP/M Graphics	64K		●			●			D4	Range goes up to £421.70 & conforms to GKS Graphics Standard.
Language	£488.75	CP/M	●	CIS Cobol	64K		●		●	●			M11	Also on Unix. Compact, interactive ANSI 74 standard implementation of Cobol.
	£1,109.75	CP/M	●	Level II Cobol	96K		●		●	●			M11	Also on Unix & MS-DOS. High level ANSI 74. Compiler, mainframe-compat code.
	£396.00	CP/M		Fortran 80	48K		●			●			T2	Useful for scientific applications, where Pascal is inefficient.
	£285.20	CP/M	●	Pascal — MT+	64K		●			●			X1	ANSI standard Pascal for Z80 processors. Also on CP/M 86 (£484-90).
	£210	CP/M	●	Supersoft C Compiler	48K		●		●	●			M4	Also on CP/M86, MS/DOS, PC. DOS. Fast implementation of C.
	£16.85	BBC Model A	●	Lisp on the BBC	16K	●			●				W1	Also on BBC Model B. Book available £7.50. Lisp is artifical intelligence language.

	£230.00	CP/M	●	PROPascal	48K		●		●	●			E1	Also on C/DOS. Needs ZX200 disk drives. Native code Pascal.
	£40.19	Sharp MZ80A	●	Forth	48K	●			●				K1	Also on MZ80K & Osborne. Allows implementation of full fig Forth.
	£421.70	Any 8 or 16 bit machine		PL/1	48K		●			●			D4	A compact implementation based on Ansi standard general purpose subset of PL/1.
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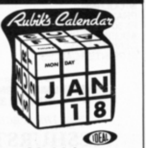
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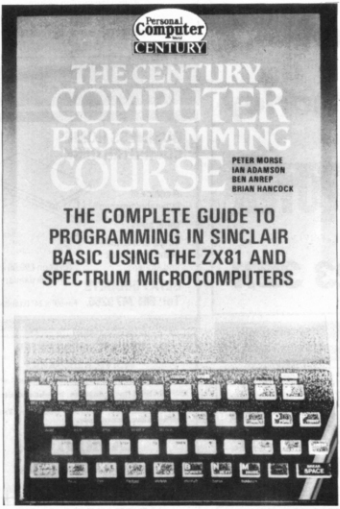
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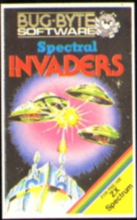
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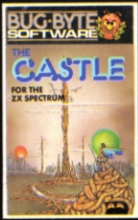
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